



VOL. XXX.

CLEVELAND, O., JULY 21, 1904.

No. 3.

### REMARKABLE NAPHTHA BOAT.

Buffalo, July 12.—There was a naphtha boat put into the water here the other day that is making a distinct bid for a position in the very wavering and so far uncertain line of improvement of craft of this sort that will give us on the



GOLDEN'S NAPHTHA BOAT ON THE STOCKS.

water what the automobile is giving us on land. It is claimed and with apparent reason that the racer on water is not in sight yet and that the Vanderbilt 60 H. P. craft that won a race the other day was making only 16 miles an hour.

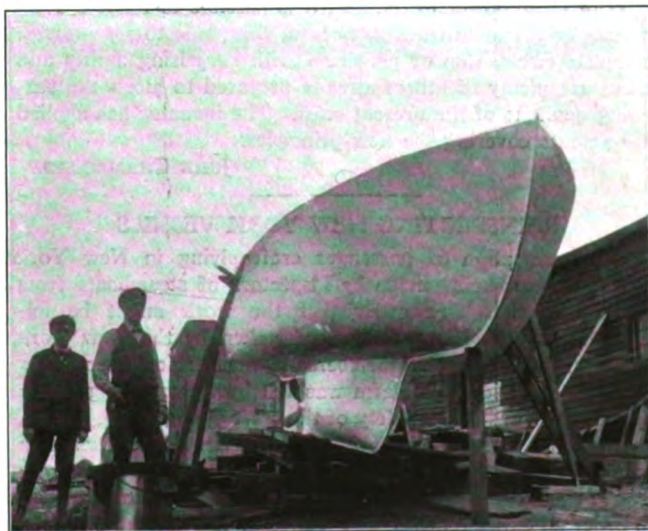
Capt. Samuel Golden is a builder and navigator who has studied the science from all sides a long time and he has lately taken up the speedy launch question with a will, with the result so far of evolving a boat that is at least a novelty and that it is attracting the attention of marine and yacht men here is saying very little of the venture. He declares that there is nothing hereabouts that can outsail it and that there is not a torpedo boat in the United States navy that has its speed.

For all that it is built, as he says, merely to demonstrate a principle and is not calculated to run fast. He began by

fastening to the bottom of a very shallow boat of 35 ft. in length and 7 ft. beam, a fin keel that is really an engine house and which carries a four-cylinder gasoline engine of 20 H. P. The keel is 16 ft. long and 2 ft. wide. It is all of its 29 in. depth under water and the boat draws about 5 in. more, so that the deck as now constructed is just above the water line.

The engine is practically all below the deck of the boat and in that position is calculated to accomplish two things and herein lies the chief claim of the inventor to novelty and efficiency. With the center of gravity so low the boat stands up as stiff as a church, without a particle of ballast besides. Eight men stood on her rail amidships the other day and did not keel her over perceptibly. A second claim is that with the engine down so low the shaft is parallel with the direction of the power needed, and there is nothing lost, as in case of naphtha boats generally.

Then the apparatus is so nicely adjusted as regards steering gear that it can be handled like a toy. It stops or goes ahead with all the agility of an athlete racer and it whirls about almost as if on a pivot and so fast that it fairly makes one dizzy. It is a wonderful sea boat. All that has to be done



THE ENGINE IS IN THE FIN KEEL.

with a big swell, whether stirred up by the wind or by the wheel of a great steamer, is to stand head on and the boat rides over it with the greatest ease. Then it has shown some



great staying qualities when allowed to drop off into the trough of the sea. The peculiar construction of the bottom, the great steadiness of the whole craft prevents its rolling as such a boat would be expected to do.

Capt. Golden says that he can manage her with a sail and beat to windward so that he could easily get off a lee shore with her. He says, moreover, that there is no limit to the power that can be put into such a keel and that he is convinced that a steam engine would be quite as available as



BROADSIDE VIEW OF THE BOAT.

a gasoline engine, as the flywheel needed would then be eliminated. He claims that he can put power enough into such a compartment to drive a government cruiser or an ocean liner and that he can give such a boat the speed of a railroad train. As a life-saving boat it also has great claims, though the present craft is not built to demonstrate that principle.

In fact there is no need of describing the present boat at all minutely, as it is not of any real significance. It merely enables the inventor of the keel-engine and direct shaft device to show that he has something that is worth developing and adapting to special uses. He claims that she is now good for, say, 16 miles an hour, and that she could be made to do considerably more, even with the present shaped hull and engine. It will be seen that the construction of the boat is such that the wheel is never out of water and it is claimed that it is placed back of the end of the keel so that it develops the greatest possible power. Practically what the owner must navigate is the fin keel of 16 ft. by 2 ft., as the rest of the craft is either above water or merely rests on the water.

With large power in the keel it is possible to make a comparatively big main boat dart about, from side to side, turn a complete circle, stop or go ahead with surprising agility and there are plenty of others already prepared to attest the sea-going qualities of the present craft. The inventor has applied for patents covering the new principles.

JOHN CHAMBERLIN.

#### REINSPECTING NEW YORK VESSELS.

An examination of passenger craft plying in New York waters is now being made by inspectors of steamboats from various districts. In order that the work might be impartially done it is not being undertaken by the New York local inspectors but by members of the service from other districts. Considerable alarm was felt by the traveling public of New York as to the safety of the craft plying in the harbor, particularly those whose primary business is the excursion trade, and one of the last acts of Secretary Cortelyou, who was at the head of the department of commerce and labor, was to order an entire reinspection. Singular to relate no attention at all was paid the first couple of days to this order. The rules of the service, which are as iron bound as statutes, provide for an inspection once a year and it was held that such an inspection had already been made. Public sentiment was against any such red tape, however, and the order was subsequently carried out. A number of vessels have been inspected

and as a general rule it might be said that they are all in good condition, owners meanwhile having seen to it that whatever needed replacement in the way of life-saving equipment had already been attended to.

#### LAUNCH OF THE WILKESBARRE.

The Harlan & Hollingsworth Co. launched recently the first of the two new ferry boats now under construction at their yard for the Central Railroad Co. of New Jersey. This boat was named the Wilkesbarre and was christened by Mrs. Theodore D. Wells, whose husband is a member of the firm of Wintringham & Wells, naval architects of New York city, designers of the vessels. The contract for these boats was signed Feb. 17, 1904. From the time the keel of the Wilkesbarre was laid until she was fully plated was thirty-five working days. Delivery will be made about Sept. 15, which is about seven months from the date of contract. These vessels are of the following general dimensions: Length between propeller posts, 176 ft.; length over guards, 207 ft.; beam, moulded, 44 ft.; breadth over guards, 65 ft.; depth, moulded, 17 ft., and are each equipped with one inverted, direct-acting, triple-expansion engine, 19-30-35-35 by 30 in. stroke; three boilers of the straight through or gunboat type, with two Morison furnaces in each, for a working pressure of 170 lbs.—each boiler 8 ft. 9 in. mean diameter by 20 ft. long inside. The joinery work is to be of hardwood throughout. The vessels to be thoroughly equipped with electric light plant. These boats are in general appearance like the Lakewood, Bound Brook, Red Bank and Plainfield, which were also built by The Harlan & Hollingsworth Co. and are intended for service between Jersey City and 23d street, New York city. Both ferry boats will be delivered at least two months ahead of the time named in the contract.

#### LAUNCH OF PASSENGER STEAMER PROVIDENCE.

The new passenger steamer Providence, building for the Sound service of the New York, New Haven & Hartford Railroad, was launched last Saturday from the yard of the Fore River Ship & Engine Co., Quincy, Mass. The Providence was named by Miss Martha Willson.

The Providence is a side wheeler with twin engines, that type having been found the speediest and most comfortable for navigation in smooth waters. She is of steel and similar in construction to the big battleships, the prime consideration being safety from any chance of sinking or burning. Her principal dimensions are: Length on water line, 378 ft. 6 in.; length over all, 397 ft.; breadth of hull, 50 ft.; breadth over guards, 88 ft.; depth, 21 ft. She has a cellular bottom, 4 ft. deep as keel and extending for a length of 288 ft. amidships. She also has six watertight bulkheads extending athwartship up to the main deck. The main engines are of the double inclined compound type, having two high-pressure cylinders 44 in. in diameter and two low-pressure cylinders 83 in. in diameter, with a stroke of 108. With a steam pressure of 150 lbs. and the engines making 26 revolutions per minute there will be developed approximately 5,500 H. P., which will drive the vessel at a speed of 19 miles per hour. Steam is generated in six cylindrical, single-ended boilers 14.9 in diameter and 12.2½ long. A donkey boiler is also fitted. These boilers are fitted for forced draft. The vessel is lighted throughout by electricity. The decorations of the saloons, etc., will be in ivory and gold. There are, all told, 404 staterooms, ten bridal chambers and 1,202 berths, accommodating about 2,500 passengers.

It is announced that the new steamer which Harland & Wolff, Belfast, Ireland, will build for the White Star Line, will be named Adriatic. She is to exceed the Baltic both in size and speed, being half a knot faster.



## LIFT LOCK OF TRENT CANAL.

With the completion of the hydraulic lift lock at Peterborough the Trent Valley canal is now open for continuous navigation from Heeley's falls on the Trent river to beyond the shores of Balsam lake, a distance of over 126 miles, passing through a district rich in agriculture and industry. The lock was built to overcome the fall in the waters of the river Otonabee between the two points, Nassau, about four miles north of the town, and Little Lake, a broadening of the river, opposite the town. The difference in elevation between the two points is 77 ft. the river having that fall in the distance

used to assist in taking the load. The construction is of plate girder design. In France the second lock was built at La Fontinettes. It is of moderate dimensions, the canals of the district being only 17 ft. wide. The third lock is at La Louveivre, in Belgium, on the Canal du Centre, and is of the truss girder pattern. These locks have been more or less successful and while the operation showed conclusively that the principle of a hydraulic lift lock is a correct one, defects were apparent that could be avoided in the construction of other locks.

In reaching a conclusion the Dominion government decided



LIFT LOCK OF TRENT CANAL.

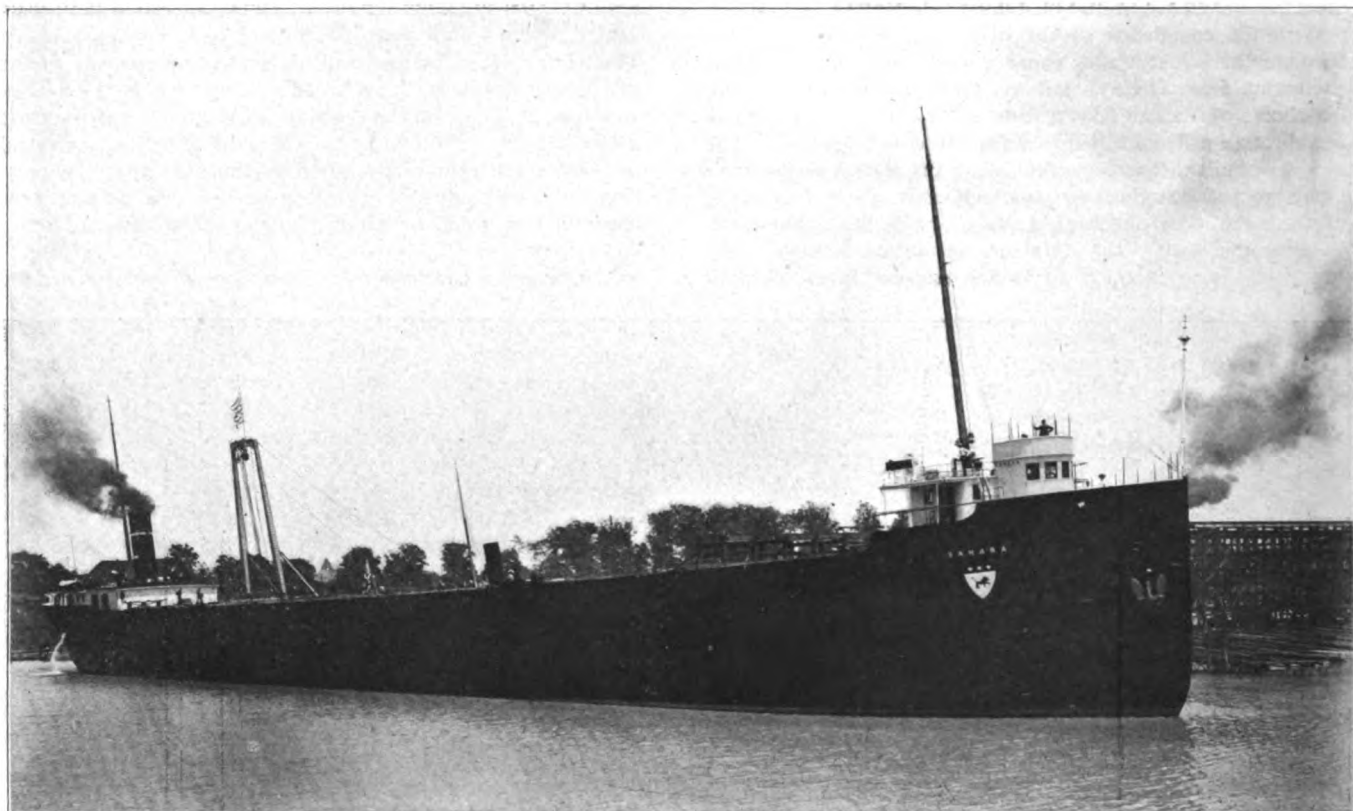
indicated. Above Nassau and up to Lakefield between which points the fall in the river is very pronounced, the river is canalized and made over into several stretches of still water, with locks of the ordinary type between the stretches. Of the difference in level referred to above Nassau and Little Lake, 65 feet, is taken care of by the lift lock, the remaining 12 ft. being overcome by a lock of the ordinary type placed at the debouchment of the canal into the lake.

Like all engineering projects of some considerable magnitude, the lift lock has been perfected by a process of evolution. First one was built, then a second, then a third, and lastly the Peterborough lock. The latter differs very materially from the first. It combines the results of experience and the advance in engineering practice such as has been made in the last thirty years, for that period has elapsed since the first lock was constructed. The pioneer lock was built at Anderson, England, and connects a local system of canals with the river Weaver, serving principally the carriage of products from salt works in the vicinity. The lift at this lock is about 50 ft., but its barge capacity is relatively small, the chambers being only 70 ft. long by 14 ft. wide. No receiving pit was provided, the chambers discharging directly into the river. Pumps were also

to find out just how successful the locks already in operation were, the probable maximum capacity, some fair estimate of the cost of construction, and all possible information as to the best form of lock, and of what materials to construct it. Following this decision, Mr. R. B. Rogers, superintendent of the Trent canal, of Peterborough, was instructed to proceed to Europe, in 1896, and to subsequently report. Mr. Rogers made the trip, gave the matter thorough attention, acquired a large amount of information and saw the three European locks in operation. He was well received, and the results of previous experience placed at his disposal. On his return he reported to the government that the plan was thought entirely feasible, and practical, and afterwards work was begun on the plans. No detailed plans or drawings were available from European sources, though these were not essential, as the conditions to be met with in Canada differed very materially from those under which the European locks had been constructed. Little of the detail of these has been incorporated in the Canadian lock, and practically nothing except the general principle of making use of the idea of the hydraulic press, a matter common to the world for very many years.

It seemed rather a bold undertaking to plan and build such





THE SAHARA, THE SECOND LARGEST FREIGHT CARRIER ON THE GREAT LAKES, OWNED BY THE GLOBE STEAMSHIP CO., DULUTH.  
[Built at the Lorain yard of the American Ship Building Co.]

an important work wholly by local men, when it is well known that on the continent such undertakings are placed in the hands of engineers of continental and often world wide reputation and wide experience. It is greatly to the credit of the staff of the Trent canal office here, and the results fully justify the confidence reposed in them.

Having determined the general dimensions of the proposed lock, and its capacity, and keeping in mind the conditions under which it would operate, and looking into the future, the general plans were prepared. From these the detail drawings were worked up, and from time to time as improvements suggested themselves they were adopted. Some idea may be had of the responsible character and magnitude of the work involved from the fact that hundreds of separate drawings were made during the progress of the work.

The general arrangement of the lock was laid down by Mr. R. B. Rogers, superintending engineer of the canal, and on him the department of railways and canals places the responsibility of conducting the work. The layout of the embankments and the preliminary plans of the concrete work were prepared by Mr. T. A. S. Hay, who afterwards resigned his position on the staff to become city engineer of Peterborough. The excavations and embankments were commenced under Col. H. S. Greenwood, then engineer of the Peterborough-Lakefield division of the canal. After making the concrete plans of the superstructure and the working plans of the concrete work Mr. Walter J. Francis, engineer of hydraulic locks, was appointed in 1900 to succeed Col. Greenwood on his departure for South Africa, and he has since been in charge of the whole construction. Mr. John Rankin was inspecting engineer of steel work during manufacture and erection.

The contractors for the steel work, The Dominion Bridge Co. of Montreal, are referred to by the government engineers in the highest terms of praise for the painstaking studies of the problems involved in this immense undertaking and the

highly creditable manner in which their work has been performed. Many of the details adopted originated with the officers of the company, who were required by the contract to make and submit details for approval.

The gentlemen more particularly interested for the company were Messrs. Phelps Johnson, manager; G. H. Duggan, late chief engineer; and D. A. Murphy, mechanical engineer in charge of the work. The general erection was carried out under the superintendence of Mr. E. W. Nichols.

The lock itself has already been described in the Review but the following tabulated facts are of interest.

Height of lift, 65 feet.

Dimensions of Presses:—External diameter of cylinders, 8 ft. 3½ ins.; diameter of ram, 7 ft., 6 in.; working stroke, 65 ft.; the largest ever built.

Pressure in presses during operation, 600 lbs. to the square inch.

Approximate weight of water in each chamber, 1,300 tons.

Depth of water in chamber, 8 ft.

Dimensions of Chambers:—Two, each 140 ft. long, by 33 ft. wide; depth, 9 ft., 10 in. Built of steel plates.

Height of Guide Towers:—100 ft. from foundation. Base of tower, 26 ft., 6 in. x 40 ft., 8 in. Central tower slightly smaller.

Breast Wall of Lock:—40 ft. thick, 80 ft. high and 126 ft. long at base.

Substructure of Lock:—Concrete; the largest monolithic mass of concrete in the world. It contains over 26,000 cu. yds.

Cost of lock, \$500,000.

Excavation work commenced in 1896.

Concrete work commenced in 1900.

Steel superstructure manufactured in 1901, erected in 1902-3.

Superintendent and designer of lock, R. B. Rogers.

Contractors for excavation and substructure, (concrete) Corry and Laverdure, Ottawa.



Contractors for superstructure, (steel work) The Dominion Bridge Company, Montreal.

Earth removed in excavation, 120,000 cu. yds.

Quantity cement used in concrete work, 26,000 bbls.

Time of lockage: 12 minutes.

Actual time of vertical motion: 1½ minutes.

The lock proper is automatic. Gates and capstans are worked by hydraulic power.

### PROGRESS OF BRITISH SHIPPING.

Liverpool, July 11.—The navigation and shipping returns of 1904 just issued go to show that British shipping does by far most of the carrying trade between the ports of the United Kingdom and those of foreign countries and the colonies. Taking the tonnage alone, the British increase for entrances and clearances was 4,309,066 tons, the increased tonnage for foreign vessels being 1,437,559 tons. Thus the tonnage preponderance of British owned vessels on the year was 2,871,507 tons. The following are the details: British vessels entered 35,741 (decrease 124), tonnage 34,349,028 (increase 2,046,592), cleared 35,061 vessels (increase 16), tonnage 34,862,945 (increase 2,262,474). The total number of British-owned vessels actually employed in the home and foreign trade, as registered, was 14,413, and of persons employed on them 257,937, including 176,520 British, the rest being foreigners and Lascars.

From the return compiled by Lloyds Register of Shipping it appears that, excluding warships, there were 392 vessels of 930,688 tons gross under construction in the United Kingdom at the close of the quarter ended June 30, 1904. The tonnage under construction is now about 4,500 tons more than it was at the end of March last. Compared, however, with the total reached in September, 1901, which is the highest on record, the present figures show a reduction of 420,000 tons or about 30 per cent. Of the vessels under construction in the United Kingdom at the end of June 313 of 750,982 are under the supervision of the surveyors of Lloyds register with a view to classification by this society. In addition fifty vessels of 150,822 tons are building abroad with a view to classification, making a total of 372 vessels of 901,844 tons building under Lloyds supervision. Details of this total show that there are building in the United Kingdom for home account, for sale, etc., 268 vessels of 628,243 tons gross; building in the United Kingdom for foreign and colonial account, forty-five vessels of 122,730 tons gross, building abroad for United Kingdom owners, eleven vessels of 7,305 tons gross, and building abroad for foreign account forty-eight vessels of 143,557 gross tons. Of the total of 903,688 tons building, 312 vessels of 808,597 tons are for British owners.

The following particulars relating to emigration, particularly to the United States, will be read with interest at the present juncture. It appears that the number of emigrants who left Britain for places out of Europe during June was 37,128 as compared with 37,643 for the corresponding month of last year. The numbers of British nationality increased from 10,612 last year to 22,919 this year, while the number of foreigners was only 14,747 as against 17,570 last year. It is evident that the reduced fares have had a considerable effect on emigration, because, although the total number of emigrants is slightly less, the departures for the United States increased from 20,857 last year to 22,119 this year; while Canada received 10,698, as against 9,995 last year. It is noticeable also that, while the number of foreigners who left for the United States during June is practically the same as for the corresponding month of last year (11,388 as against 11,913), the number of foreigners who went to Canada was only 2,784, as against 4,683 last year, the great proportion of Canadian emigrants being of British nationality. The total number of emigrants for the six months ending June was 187,278, of whom 115,125 were of British nationality. The numbers for

the corresponding period of last year were 223,819 and 123,259 respectively.

Mr. James McKechnie, engineering director of Messrs. Vickers Sons and Maxim's works, Barrow, which employs 10,000 men and pay \$77,000 weekly in wages, reviewing the history of naval progress during the past ten years, says the armor which the firm's Sheffield works send to Barrow for the battleships they build there has increased in its resistance to penetration by about 30 per cent, but still greater progress has been made by the introduction of Vickers' gun. A 12-in. gun can develop an energy of 50 per cent greater than was obtained by the service weapon of corresponding caliber ten years ago, and similar advance in power is reached with smaller artillery. In view of the perfection of gun mountings it is now possible with the largest ordnance to more than double the rate of fire. The use of capped shot has further added to the victory of gun over armor, for while ten years ago Harvey plates were almost invincible, 12-in. shot or shell can be produced which will perforate 16 in. of Krupp armor at a range of 5,000 yards.

The Prince Line has decided to run a line of steamers to South Africa from British ports. On Saturday, July 9, the first departure of the service took place from Liverpool. It is understood that at present the boats will go to New York to complete loading, but as soon as sufficient cargo offers it is the intention to proceed to South African ports direct. When the Prince Line boats are not available, the company undertake to send cargo by other vessels to New York where it will be transhipped to one of the Prince Line vessels, where a line of steamers to South Africa is presently conducted.

There seems also to be greater activity in Canadian shipping matters just now. The Canadian Lines, Ltd., have chartered the Elder-Dempster steamer Lake Simcoe to run between Rotterdam and the St. Lawrence, and the Canadian government are reported to have called for tenders for the working of two monthly steamship lines between the Dominion and Mexico for a period of five years. The vessels must have a carrying capacity of not less than 3,000 tons, with accommodation for passengers, and a speed of at least 10 knots. It is understood that the Mexican government is prepared to grant subsidies amounting to \$120,000, Mexican, and the Canadian government will supplement this subvention.

The White Star liner, *Germanic*, is about to be re-christened the *Ottawa*, and enter the Dominion Line service from Liverpool to Quebec and Montreal. Previously intended for the Dominion Line service, when she was to have been re-named the *Labrador*, the *Germanic*, in view of the mishap to the New York of the American Line, was, however, placed in the Southampton and New York service, but will leave at the completion of her present voyage and proceed to Liverpool for overhaul. She will sail on the first voyage to Canada on July 21. Built in 1875, the *Germanic* was engaged in the White Star New York service for a quarter of a century, and undoubtedly she will prove highly popular in her new sphere.

I have it on excellent authority that, commencing with the Finland, which leaves Antwerp for New York on Aug. 6, the steamers of the Red Star Line will, in future, make Dover a port of call for embarking and landing passengers. Hitherto the steamers of this line have made the voyage direct from Antwerp to New York. The intermediate service of the Hamburg-American Line to and from New York, which has hitherto been dealt with at Plymouth, is to be transferred to Dover, the last arrival at Plymouth being the *Pennsylvania*, which called this week. The immediate result of the change is to prolong the voyage from New York nearly 20 hours, but there is a financial saving to the company, as the steamers will not call at Cherbourg.

The Korean navy consists of twenty-five admirals and one iron-built coal barge.



### SHIPPING LETTER FROM SCOTLAND.

Glasgow, July 5.—You will have received in your exchanges a note of Lloyd's returns of the world's shipping, showing that the tonnage under the British flag is 16,580,845 tons and under the American flag 3,849,399 tons as against 16,006,374 tons and 3,611,956 tons a year ago. Ours has increased by 574,000 tons and yours by 238,000 tons. In connection with these statistics and the predominance of British shipping are two facts of great significance the Glasgow Herald comments on. The one is that, while the tonnage of steamers is increasing over the whole world, that of sailing vessels is diminishing. On the shipping registers of all maritime nations there are today about 1,500,000 tons more of steam tonnage, and 350,000 tons less of sailing tonnage, than there were a year ago. It would seem that steamers are being employed more than ever in the coasting and ocean trade of the world and that the days of sailing ships may (as some think) soon be numbered. The second significant fact is, that close on fifteen millions of the total British tonnage is composed of steamers and that sailing ships are represented by only one million and three-quarters. But the sailing tonnage of other nations has not fallen off in the same proportion as our own, the result being that their combined steam tonnage is considerably less than one-half of that owned in Great Britain. This, of course, cuts two ways. If calculated on the recognized basis that steamers are three times more effective in carrying power than sailing vessels, our steam tonnage is so much superior to that of the rest of the world it follows that in order to keep it profitably employed the lion's share of the carrying trade must be secured. That is not always the case, and hence the depression that frequently prevails in the British shipping industry.

Concerning the Atlantic rate war, the White Star company have met the situation created by the Cunard company. The latter having cut their eastbound rates, White Star steerage rates are reduced to the same extent. The steerage round trip rates charged by the Cunard vessels are now £5 to £6. As the White Star and German lines are practically working together against the Cunard, the latter are fighting for their own hand against all combinations. The shipping combination have replied to the rate cutting by the Cunard company by a similar reduction in fares to Europe. The Hungarian minister of the interior has granted the Cunard Line authorization to forward from Fiume to New York emigrants coming from any part of Hungary. The minister has assented to the Hungarian Navigation Co. representing the Cunard Line both in emigration matters and in their relations with the authorities, and the public; the Hungarian company to enjoy full rights and to accept full responsibility on behalf of the Cunard Line.

A war of rates on the Atlantic is not a new thing, and of course it does not pay. In the period 1888-90, when the Inman Line steamers were transferred from Liverpool to Southampton, they were carrying passengers at 25s and 30s each, and paying an agent out of it 6s per head commission. That condition of things continued over a prolonged period. The present steerage passenger rates of £2 and £2 10s are handsome by the side of the freight rates which some companies are taking from America, such as grain at from 2s to 3s a ton including loading and discharging, and bacon and lard at from 4s to 6s a ton. These charges have now been in operation for about two years.

The International Sailing-Ship Union's new international scale of minimum freights for sailing ships begins to take effect on July 15. Minimum rates from Australia are now in force for immediate loading, while from San Francisco the rate applies now for any charter with days 15th July or later; from Tacoma and Portland (Ore.) rates apply now for any charter with days 1st September or later; and from

Chili the rate applies now for any charter with days 15th August or later.

A Sheffield inventor has received and professes to have carried out the old idea of a steamer with propellers all along each side. This time the propeller shafts are to slope downwards into the water, so as to have a lifting effect on the vessel which will gradually rise according to the speed, this going on as accelerated motion is secured. The ship will not have to plough a hole through the water. I do not know how high the action of the propellers will raise the vessel, but this should be accurately calculated.

In a previous letter I mentioned briefly an automatic apparatus for exhibiting a code of signals showing the rise and fall of tide day and night in any waterway, harbor, or dock, patented by Mr. Martin Boyd, harbor master, Irvine. This system has now been in operation at Irvine harbor for the last three months, and has not only completely fulfilled the anticipations of the inventor but has proved of great advantage to ship captains and others visiting the port, inasmuch as they at once see the depth of the water in the harbor. The apparatus is enclosed in a tower and is actuated by a float, which rises and falls by the action of the tide in a suitable well, placed in a convenient position which may be either some considerable distance from the tower or directly under it, as local circumstances permit. The vertical motion of the tide, or change of water level, is transmitted to the apparatus by gearing attached to the float. At each foot of rise of the tide an eclipser in front of the apparatus opens one of the apertures through which the lights are seen seawards, and an eclipser at the back acting in like manner shows the lights landwards, thus acting as tell-tale lights and enabling the code of signals to be read from the land side. On the ebb, the eclipsers act in reverse order, eclipsing the lights one by one at each foot of fall of the tide. The lights which show seawards are fitted with powerful lenses, and can be seen at a distance of 10 miles in clear weather, and at a lesser distance, according to the state of the atmosphere. The source of light in this case is gas. For day signals a code of balls is used. These balls are connected on wire ropes which pass over pulleys on the cross arm of the flag-staff. At each foot of rise of the tide they one by one appear above the tower, and when the tide falls they disappear within the tower. The balls are so arranged that the same number of balls is always visible, and in the same relative position as the number of uneclipsed lights. To correspond with the difference in color of the lights, differently shaped balls are introduced, thus making the day code similar to the night code. The advantages claimed are: the apparatus is of a very durable construction, is not liable to get out of order, and the maintenance will be practically nil; the signals are entirely automatic, and do not require an attendant, they are not complicated, being easily read and committed to memory: it enables a uniform system of signalling to be adopted at all harbors, docks or waterways, and will accurately show the available depth of water by day or night at all times.

Two vessels built in recent years for the British navy which have not come up to contract have been yachts. The new admiralty yacht, designed and constructed by Harland & Wolff, which has been returned to her builders, has not proved satisfactory in all respects. The specification required that with a displacement of 3,190 tons she would steam 18 knots with the engines developing 6,000 H. P. It has been officially notified that with the engine indicating 6,077 H. P. the speed attained was only 17.50 knots, while with 3,191 H. P. the measured mile speed was 15.22 knots. It is hoped that with new propellers the guaranteed rate will be attained, and other alterations suggested by the first cruise may improve the seagoing quality of the ship. The question of propeller efficiency is one of extreme difficulty, as is further proved by the recent Atlantic performance of the Kaiser Wilhelm II. Up



till now the vessel has not succeeded in maintaining 23 knots for any length of time, but impressed with the gain in speed in the case of cruisers as a result of a change in propellers, the builders and owners decided to fit new propellers to the Atlantic liner, increasing the blade area very considerably and thus a marked addition to speed has been attained. The increased area has so improved the propeller efficiency that the mean speed of the ship has become 23.7 knots. On the last two days of the trip, when the displacement had been considerably reduced owing to the depletion of the coal in the bunkers, a rate of 24½ knots was maintained.

It is stated here that a large new market will be opened up for Canadian fish, coal and timber by the inauguration of the steamship services between Canada and Mexico. The services, we hear, are to be from Montreal and from Vancouver, respectively, and all the chief Mexican ports are to be visited. Negotiations are also said to be on foot for subsidizing a line between Canada and New Zealand, with monthly sailings between Auckland and Vancouver. Last year New Zealand purchased \$7,000,000 worth of goods from the United States and as there is a preference given to imports from British colonies it is believed that a great many of these goods would come from Canada, if a direct line were established. Wool, flax, hemp, kauri gum and other goods, could be carried as return cargoes.

So many strange things happen in business that no shrewd business man ever scoffs at the idea of "carrying coals to Newcastle." We send pig iron to America, and America sends pig iron to us. We send steel to Canada, and Canada now sends steel to us. A steamer is even now discharging in the Clyde a cargo of steel billets from Sydney, C. B. The Donaldson Line steamer *Indrani* sailed last Saturday for St. John, N. B., and Baltimore, and part of her cargo was about 1,000 tons of anthracite treble nuts, which were bagged from the wagons alongside the ship's berth, weighed, sewed and slung aboard by the hydraulic cranes. It is not often that coals are exported. But it is odd that Scotland, which has only a very small proportion of anthracite in her coal fields, should be sending any to within measurable distance of the largest supplies of anthracite coal in the world.

One result of the experiences of naval warfare in the Far East will be a reconsideration of the armament of our battleships. All the engagements by the Russian and Japanese fleets have been at long range, and guns of high caliber have been more effective than moderate sized weapons attaining high rates of fire. These latter are, no doubt, always desirable, because occasions must arise when it is of the greatest importance to get in many shots as quickly as possible. But the primary consideration must now be the maximum muzzle energy from the greatest number of guns, consistent with as high a rate of fire as possible. The 6-in. quick-firer, hitherto regarded with so much favor for the secondary armament of our ships, can no longer be accepted as satisfactory. In many of the engagements the 6-in. gun proved deficient in range and could not be used, and the ships had to depend entirely upon their 12-in. breechloaders. In the two which were captured from Chili by the British admiralty (now the *Triumph* and *Swiftsure*) this point was anticipated, and the secondary armament of 7.5-in. caliber, with about double the striking energy of the 6 in. weapons. In the *King Edward* class there are four 9.2-in. as well as four 12-in. weapons. There are mounted on the broadside ten 6-in. quick-firers, and the question now being considered is whether these 6-in. guns should not be discarded and the weight saved utilized for mounting a fewer number of guns of greater power. To increase the number of 9.2-in. weapons would involve extensive structural alterations, as their mountings are of considerable weight. If 7.5-in. guns were fitted within the existing gun battery, as in the *Triumph* and *Swiftsure*, there would be a material improvement in the gun power with very little

change in the structural arrangements of the ships. The work in connection with the new design of this year's battleships is being considered on these lines.

### IMMENSE PROFITS OF WHITE STAR LINE.

One of the most interesting articles in the *London Times* is devoted to an exhibition of the net earnings and financial methods of the White Star Line from 1871 to the close of 1903. The article contains a table giving information as to earnings, dividends, etc., hitherto absolutely withheld from public knowledge. The article opens with a review of the methods of T. H. Ismay, who had complete control of the management of the company for many years. He was a believer in the most rigid secrecy, and so arranged matters that while he was fully informed of the operations of his competitors, none of them could obtain the least knowledge of the affairs of the White Star Co. His management of the company was always obviously successful, but the actual success was far greater than outsiders surmised. In the blackest years the earnings never sank below a point which may be regarded as marking a very respectable success, and today the White Star fleet retains its great earning power, and, according to the writer of the article, is the one bright spot in the gloomy failure of the International Mercantile Marine Co. to carry out its ambitions of conquest.

The table shows that there was only one year when the net profits were less than 5 per cent on the capital; only three when they were less than 8 per cent, and only nine when they were less than 20 per cent. The highest net earnings were in 1900, when they amounted to 100 per cent on the capital. For six years the net earnings were over 50 per cent a year; for eleven years over 40 per cent; for fifteen years over 30 per cent, and for twenty years over 25 per cent.

The highest dividends declared were 15 per cent, and the most common dividend was 10 per cent. Thus it appears that the bulk of the earnings was applied to the depreciation and insurance fund and the building up of the fleet. The article concludes:

"In 1807 the fleet had become a credit against the capital of £2 4s. 8d. per ton, and in 1898 this credit advanced to £3 7s. 9d. In other words, the White Star Line had in these two years their share capital intact, a reserve fund as large as the share capital, and the whole of the valuable fleet paid for by means of past savings out of revenue. Money, moreover, was owed to the line by their ship builders. They had, in addition, large amounts of credit in profit and loss account, insurance fund, etc., and in 1903, when an alteration in the form of the accounts took place, these unconsidered trifles swelled the reserve to £2,830,254. We should not care to say what the White Star line was really worth to a purchaser at the end of 1901, but in view of the remarkable figures published in this article it may seriously be doubted whether, after all, the International Mercantile Marine Co. paid too big a price."

An examination will be held at the office of the engineer of the tenth lighthouse district, Buffalo, N. Y., on Monday, Aug. 15, 1904, at 11 o'clock a. m., for the purpose of forming an eligible list of superintendents in the lighthouse service. Applications must be made and submitted on or before the date mentioned, upon regular forms of the United States civil service commission, which may be obtained at the office of the engineer tenth lighthouse district, 537 Federal building, Buffalo, N. Y.

The Neptune Salvage Co., Tacoma, have begun operations to raise the wreck of the Canadian Pacific steamer *Islander*, which was wrecked with a great loss of life in the channel between Douglass Island and the mainland, Alaska, some years ago. Salvage operations are being conducted in a conical diving bell which is said to work without discomfort in sixty fathoms of water.





DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED  
OR ASSOCIATED WITH MARINE MATTERS  
ON THE FACE OF THE EARTH.

Published every Thursday by

**The Penton Publishing Company,**  
**CLEVELAND, OHIO.**

CLEVELAND:	WADE BUILDING.
CHICAGO:	MONADNOCK BUILDING.
DETROIT:	HAMMOND BUILDING.
NEW YORK:	150 NASSAU STREET.

*Correspondence on Marine Engineering, Ship Building and  
Shipping Subjects Solicited.*

Subscription, \$3.00 per annum. To Foreign Countries, \$4.50.  
Subscribers can have addresses changed at will.

The Cleveland News Co. will supply the trade with the **MARINE REVIEW**  
through the regular channels of the American News Co.

Entered at the Post Office at Cleveland, Ohio, as  
Second Class Matter.

JULY 21, 1904.

The Review has lately endeavored to ascertain whether the extension of the customs act to the Panama canal zone, whereby all goods entering the zone from foreign countries pay the same tariff that they would have to pay at any United States port, did not also extend the coastwise laws to the zone. It would seem a very natural conclusion that if it is treated by the government as a United States port that goods going to the zone from the United States would have to go in American ships, that is, it would virtually be trade from an American port to an American port which is exclusively reserved to the American ship. The treasury department in answer to the inquiry says:

"In reply I have to inform you that while the department is under the impression that such coastwise laws have been extended to shipping between the United States and such canal zone, since the administration of the navigation laws is under the jurisdiction of the bureau of navigation of the department of commerce and labor, your letter has been referred to the secretary of that department for reply."

The secretary of commerce replied that the communication had been referred to the bureau of navigation for attention and the bureau of navigation says that the extension of the coastwise laws to Panama is now under consideration. It is therefore to be hoped

that something will be done along this line in the very near future. If American shipping interests are active they can probably secure this trade for themselves. Indeed there is every reason to believe that if they had pursued a campaign when the Cuban reciprocity treaty was made that the trade between that island and the United States might have been reserved to the American ship.

The primary object of the administration, of course, in imposing the Dingley tariff rates on all goods imported into the Panama canal zone from foreign countries is to give American manufacturers and exporters an advantage over all competitors in the canal zone. In addition to the vast amount of machinery that contractors for canal work will have to take into the zone it is expected that provisions and supplies of all sorts for the workmen who will be employed will have to be imported to the value of many millions of dollars. It is the purpose of the president's tariff order to give the American manufacturers and exporters, as nearly as possible, a monopoly in supplying machinery and all other articles that are contained in the dutiable schedules of the Dingley act. It is really no more than proper that this should be so since it is American money exclusively that is building the canal. It is not easy to see how the customs act could be extended to this zone without also automatically extending the coastwise laws. The customs act virtually makes the zone American territory and inter-trade between ports of American territory is under the jurisdiction of the coastwise laws. The bureau of navigation should make a definite ruling upon this subject as soon as possible.

The sessions of the Merchant Marine Commission are being resumed today at Milwaukee. The commission visits Milwaukee by invitation of the Chamber of Commerce, the Citizens' Business League and the Merchants & Manufacturers' association. The city of Milwaukee is making unusual efforts to entertain the commission and the various interests which have the meeting in charge have prepared an excellent list of addresses. Undoubtedly the Milwaukee meeting will be a fitting companion to the other great meetings which have been held in the lake region.

At the close of the Milwaukee session the commission goes direct to the Pacific coast and is scheduled to reach Seattle on July 25. Hearings will be held by the commission in Seattle on July 26 and 27 and in Tacoma on July 28 and 29. The commission will reach Portland, Ore., on July 30 and have reserved the two succeeding days, July 31 and Aug. 1, for hearings in that city. While in Portland the commission will be the guests of the Chamber of Commerce and the Board of Trade.

The commission will reach San Francisco on Aug. 3 and will spend the 4th and 5th in that city as the guests of the Chamber of Commerce and Shipowners'



association of the Pacific coast. The citizens of the Pacific coast are making extraordinary efforts to make the trip of the commission to that part of the country a most fruitful one.

The Review is frequently in receipt of letters asking in what form the doctrine of protection should be extended to shipping. An impartial answer to that question could not be given at present. The Merchant Marine Commission was appointed to inquire into the general state of American shipping in the foreign trade and to provide a remedy for existing conditions. The commission is obtaining invaluable information, not only as to the present state of affairs but what is also likely to be the state of affairs in the very near future unless some definite form of aid is extended. As to these forms of aid quite a number have been advanced. All of them should be thoroughly studied and digested before any decision to apply any has been reached. There is no law, however beneficent, that does not work an injury somewhere and there are doubtless objections to every plan that has been advanced for the upbuilding of the American merchant marine. The thing to do is to select a plan well within the nation's rights and which would be calculated to benefit all forms of shipping. There is no doubt whatever but that the temper of the country is in favor of the definite extension of aid to shipping. There is every reason to believe that it is even aroused upon this subject. The present position is really a dangerous one. In the event of an international complication there would be absolutely no outlet for our vast export trade.

#### FREIGHT SITUATION ON THE LAKES.

At the beginning of the year it was estimated that the United States Steel Corporation had enough ore down to last until August if not another pound should be transported during the year. The Steel Corporation in 1902 moved approximately 16,000,000 tons of ore. In 1903 it moved approximately 12,000,000 tons of ore. The vessels of the Steel Corporation have approximately a carrying capacity of 10,000,000 tons during the season. The Steel Corporation therefore chartered about 6,000,000 tons in 1902 and about 2,000,000 tons in 1903. It is not known how many tons have been chartered by the corporation during the present year but it is somewhat more than 1,000,000 tons. As navigation opened very late this year it would require unusual dispatch for the vessels of the Steel Corporation to move 10,000,000 tons. The deduction is quite natural therefore that the movement of ore by the corporation during the present year will be, roughly speaking, 2,000,000 tons. From present information this figure would not seem to be very much out of the way, though, of course, the corporation may charter considerable tonnage later. With a slight movement of ore this year—and it is undoubtedly going to be light when compared with 1902 and 1903, though it may well up to the movement of years preceding this—docks and wharves are likely to be fairly bare when navigation opens next year. While the wisest cannot see very far ahead in the iron trade it looks now as though the year 1905 would be a very active one.

The rail rate on ore has been during the past week 70 cents from the head of the lakes, 60 cents from Marquette and 50

cents from Escanaba. The contract rate for the bulk of the movement is five cents higher than this from Marquette and Escanaba, though some shippers have made season contracts at 60 cents from Marquette. However, they have very little to ship from that port and the rate established by them does not cut very much figure. The great bulk of contract ore is moving from Marquette at 65 cents. The coal movement is falling off considerably, owing to the decision of the Pittsburg Coal Co. to let up on shipments temporarily and the grain trade is absolutely dead. The result has been that ore has had to bear it all and there has not been enough of that commodity to go around.

It is announced that the lumber rate too has been shaded, the first class carriers taking it at \$2.25 as against the association rate of \$2.50. The association last year was able to hold its members to the rate steadily but appears not to have been so fortunate this year.

#### GRAIN SITUATION AT CHICAGO.

Chicago, July 20.—In the basis of  $\frac{3}{4}$  cent Buffalo corn which held on cargo lots at the outset of present week shipping inquiry meeting with indifferent responses on part of vessels. Some few moderate-sized engagements account liners paid 1 cent per bushel, and the continuance of which will probably be necessary to depart their exclusive trading in package freight. The export demand holding dull and unchanged, rates to Bay ports are at  $\frac{3}{4}$  to 78 cents per bushel and to Montreal via all water routing basis nominally 3 cents corn.

Surrounding crop reports mainly favorable. First arrival of new oats at Chicago yesterday with generally good reports from southwestern points gives fair warrant of nearby extensive movement through Chicago both in oats and corn.

Of the weekly shipments below, distribution is noted about as follows: Via all rail routing wheat 122,000 bu., corn 160,000 bu., oats 73,000 bu. Via lake to Buffalo, etc., wheat 25,000 bu., corn 1,500,000 bu., and oats 250,000 bu., and to Canada points via lake about 175,000 bu. corn.

##### Lake and Rail Shipments:

	This week.	Last week.	Same week last year.
Wheat .....	147,200	216,258	409,310
Corn .....	1,878,008	1,906,802	2,471,632
Oats .....	980,215	744,585	1,350,234
	2,005,513	2,927,645	4,321,176
	Shipments since Jan. 1, 1901.		Same time last year.
Wheat .....	7,121,587		11,601,763
Corn .....	33,914,892		44,335,995
Oats .....	25,339,155		36,476,695
	66,375,634		92,504,453

##### Stocks of grain in elevators:

	This week.	Last week.	Same week last year.
Wheat .....	2,144,000	2,285,000	3,611,000
Corn .....	5,534,000	5,345,000	7,465,000
Oats .....	736,000	1,096,000	2,003,000
Rye .....	454,000	460,000	393,000
	8,868,000	9,186,000	13,532,000

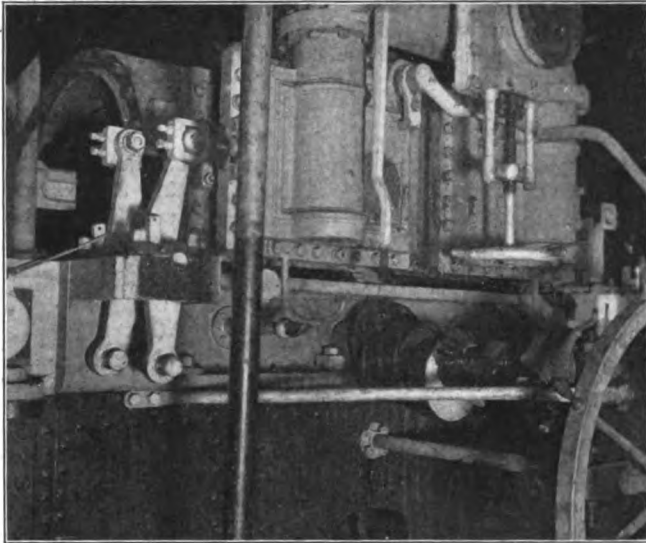
The new lighthouse tender Sumac, which the government intends for duty on Lake Michigan, will reach Chicago next month. Captain James Brooks, U. S. N., will act as first officer of the new craft.

The immense cargo which the steamer Augustus B. Wolvin took from Escanaba to South Chicago last week, consisting of 10,973 gross tons of ore, was unloaded in a little more than ten hours.



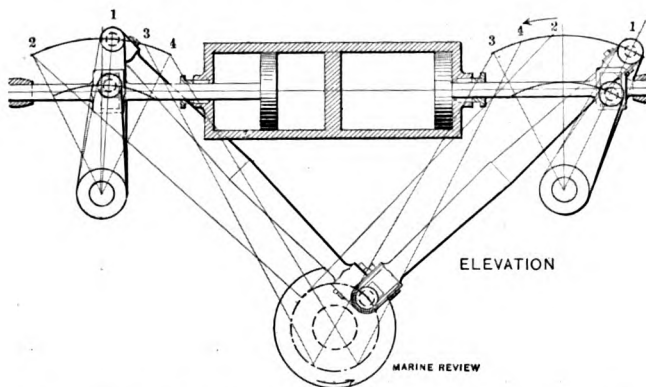
**ENGINE OF THE MONITOR MONTAUK.**

Editor Marine Review:—As a subscriber I happened to notice recently that you want photos of boats. I send you herewith three proofs. No. 1 is that of a flashlight of the engine of the Monitor Montauk, recently sold by the United



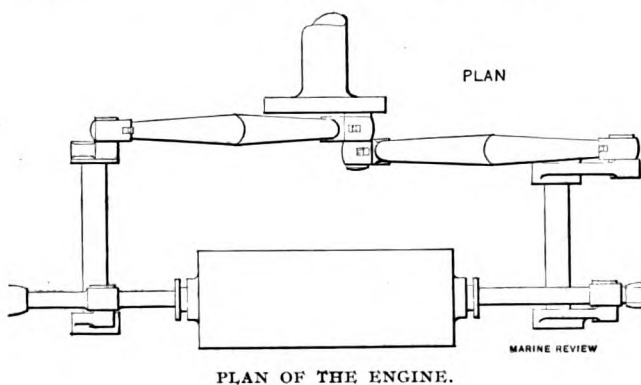
NO. 1. ENGINE OF THE MONTAUK.

States as scrap for \$1,200. She was lately towed to Neafie & Levy's, Philadelphia, to be partly dismantled and later towed to Richmond, Va. It was while she lay at Neafie & Levy's that I had the opportunity of boarding her and way down in the



THE OBVIOUS INTENTION OF THIS CONSTRUCTION WAS TO TAKE UP LITTLE VERTICAL SPACE AND TO BE ESPECIALLY ADAPTABLE TO THE MONITOR.

engine room, dark as pitch, I found this most peculiar engine. It was so dark that one moved cautiously for fear of breaking his nose. I managed, however, to get this flashlight of the engine. It has but one cylinder, the piston rod extending



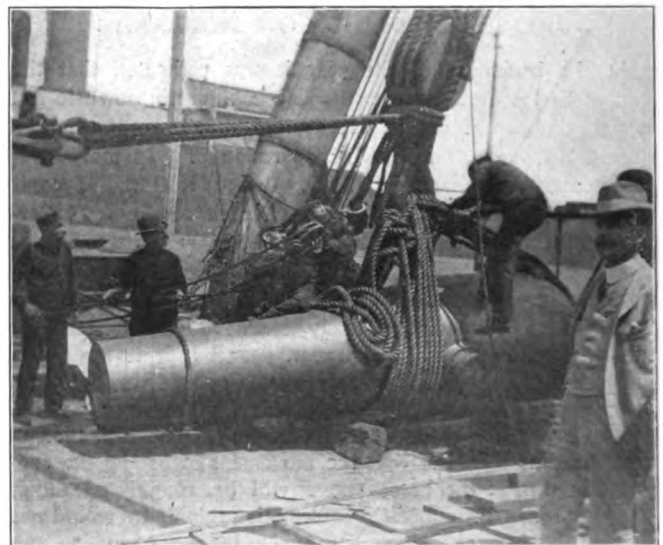
PLAN OF THE ENGINE.



NO. 2. FLASHLIGHT OF CELL, IN WHICH MADAME SURAT WAS IMPRISONED.

through each end. The cylinder lies horizontal as you see. Each end of the piston rod is connected to the end of a lever, the other end of which is keyed to a rockshaft. There are thus two rockshafts. These two rockshafts also carry another lever each and the face end of these two levers are connected by connecting rods, both of which engage with one crank pin, on the main shaft. You will see by the sketch that, although this engine has but one cylinder and one crank pin, yet it can work backward and forward, and yet can never get on a dead center. Considering the size of the engine, the space it occupies is very small. It was supplied with steam from two boilers, set athwartship, one on each side of the boat, just forward of the engine.

No. 2 is a flashlight of the cell in which was confined Madame Surat who was found guilty in aiding Wilkes Booth



NO. 3. ONE OF THE 15-IN. SMOOTH BORE GUNS IN THE TURRET.

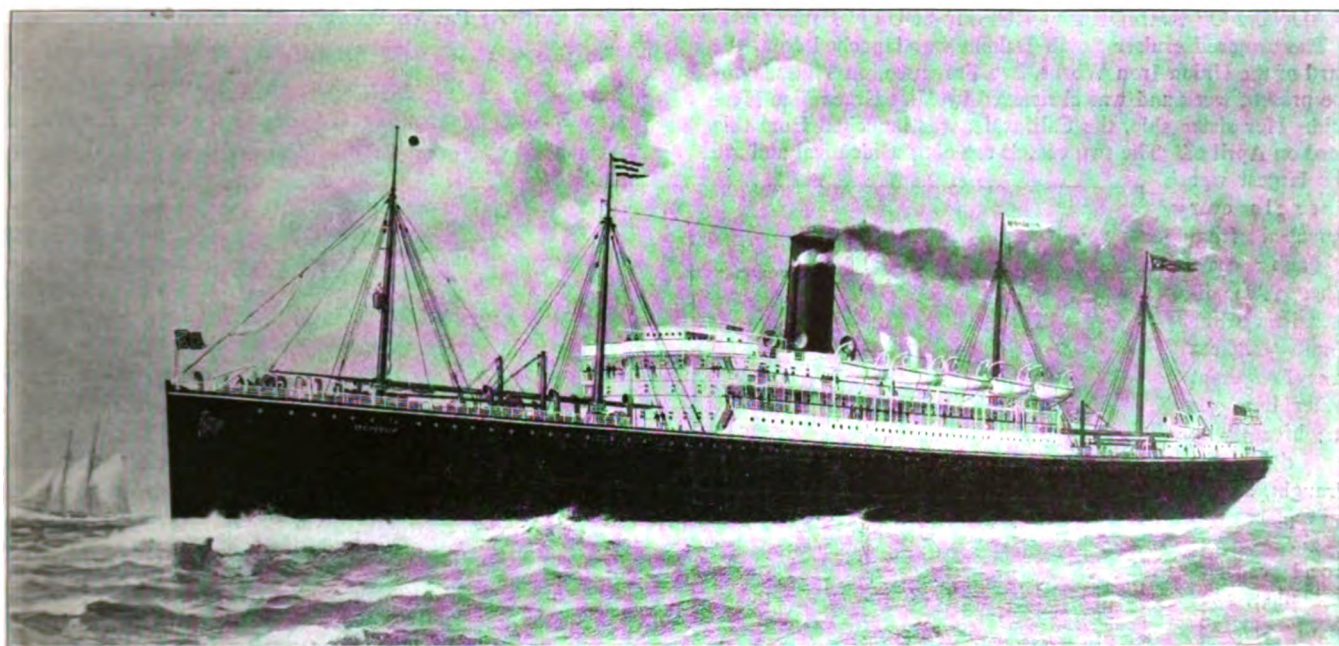
to assassinate President Lincoln and who was afterward hanged. This cell is about 4 ft. by 8 ft.

No 3 is a snap of one of the 15-in. smooth bore guns in the turret. There were two of them in the turret. This turret was about 14 in. thick and had numerous hits, the greatest one about the diameter and depth of a saucer.

Washington, D. C.

W. H. A. LANGE.





MONGOLIA OF THE PACIFIC MAIL STEAMSHIP CO.'S FLEET.

[Built by the New York Ship Building Co., Camden, N. J.]

### DISTINCTIVE PRINCIPLES OF THE TURBINE.

Although the principles which distinguish the different kinds of steam turbines are well known, it may be useful to recall briefly their distinctive characters. In common with all other steam engines, turbines transform into mechanical work the energy given out by steam during its expansion from the initial pressure of admission to the pressure at the exhaust. But, whilst reciprocating engines effect this transformation of energy by means of variations in pressure of the steam, turbines can effect this transformation both by means of the velocity of the steam while expanding. The employment of the velocity only in each moving wheel characterizes the action of impulse turbines, among which may be cited the Laval, the Curtis, and the Rateau turbines; whilst the simultaneous employment of the velocity and partial use of the pressure characterize the reaction turbine, of which the best-known type is Parsons. Whatever may be the method in which the steam acts in the turbine, the chief problem consists in the employment, with good conditions of efficiency, of the very great velocity attained by the steam in expanding. When the expansion takes place in one stage, as in turbines with a single wheel, then the velocity of flow reaches, as is well known in a condensing engine, a value which is usually above 3,600 ft. per second; but in order to obtain the maximum efficiency the moving part of the machine should have a relative velocity which is approximately the half of that of the steam. As it is practically impossible to construct turbine-wheels suitable for running with a peripheral velocity above 1,200 ft. per second, the efficiency of turbines with a single wheel is necessarily low, this being due chiefly to the necessity for the employment of diverging inlet nozzles, which give rise to great losses of energy by friction and eddying. On the other hand, angular velocities which correspond to these peripheral speeds prevent the direct driving of dynamos, and render necessary reduction gears of special and costly construction, which however, cannot be protected from excessive wear, and are exposed to accidental breakage. A consideration of these circumstances has induced inventors to divide the expansion of the steam into successive stages, and thus to produce turbines with multiple wheels, which are nothing but a series of simple turbines, mounted upon the same shaft, and driven successively by the same current of steam. This design of multiple turbines is by no means novel. It will

suffice to mention the name of Tournaire, a French mining engineer, whose theoretical description to the Academy of Science in 1863 of a reaction turbine with multiple wheels is surprising when the description is compared with the Parsons turbine brought into use thirty years later.

### BALTIC TOO BIG FOR NEW YORK HARBOR.

The new White Star steamship Baltic sailed from New York last week on her return maiden trip to Liverpool. The return trip demonstrated that the Baltic was some years in advance of the facilities of that port. She cannot be loaded to anything like her full cargo capacity on account of her great draught, which reaches 36 ft. 6 in. when she is loaded to her full limit. At high water vessels drawing 32 ft. may leave or enter New York harbor, but otherwise 30 ft. is the port's limit. The Baltic when she left drew 32 ft. 6 in. and on that draught had on board 6,000 tons weight less than her carrying capacity. She could have been loaded 1½ ft. deeper and have crossed at high tide and this would have meant about 1,500 tons weight of additional cargo. This, however, would have indicated her very best employment as a freight carrier, and she would still have been 4,500 tons weight below her full capacity. The importance of this deficit will be better appreciated when it is understood that 4,500 tons is a liberal estimate of the total cargo capacity of an average tramp steamer, so that the Baltic when coming into and leaving New York harbor is carrying about her the capacity of a complete steamship for which she has no employment.

The Board of City Commissioners of Galveston are considering an application from Charles Clarke & Co. for the construction of a shipbuilding and repair yard on Pelican Island, desiring a 50 ft. frontage there without rental for a term of twenty-five years. They claim that a dry dock is necessary there and that \$60,000 will be expended on the plant.

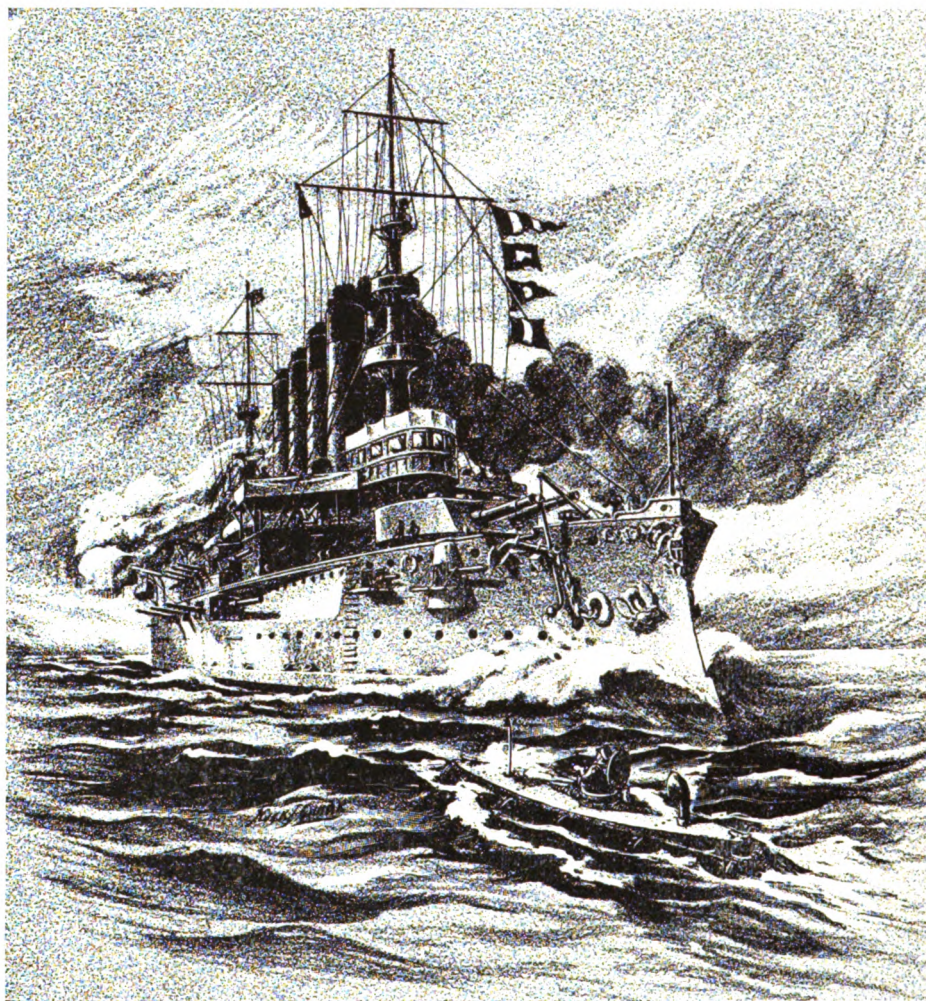
The three-masted schooner now building at Pinto Island by the Ollinger & Bruce Dock Co. of Mobile will be launched in a few days. She will be the largest vessel ever built in Southern waters. She will be 152 ft. over all, 144 ft. keel, 35 ft. beam and 10 ft. deep. The vessel is being built for the mahogany trade between Mobile and Mexico.



### LAUNCH OF ARMORED CRUISER SOUTH DAKOTA.

The armored cruiser South Dakota was launched from the yard of the Union Iron Works, San Francisco, on Thursday of the present week and was christened by Miss Grace Mae Herreid. Her sister ship, the California, was launched from this yard on April 28. The two vessels are almost identical and are

the largest war vessels ever launched from a Pacific coast port. The dimensions of the South Dakota are: Length at water line, 502 ft.; breadth, 69 ft. 6½ in.; draught, 24 ft.; displacement, 13,400 tons; coal capacity of bunker, 2,000 tons; guaranteed speed, 22 knots. The armament for the main battery comprises four 8-in. breech-loading rifles for the two turrets and two 14-ft. 6-in. guns of the same pattern. The second battery consists of eighteen 3-in. rapid-fire guns, twelve 3-lb. semi-automatic, four 1-lb. heavy automatic, four 1-lb. rapid-firing, two 3-in. field pieces, two machine guns at 30 caliber and six automatic guns at 30 caliber, besides two submarine torpedo tubes. The engines will develop 23,000 H. P. at forced draft.



ARMORED CRUISER SOUTH DAKOTA.

[Building by Union Iron Works, San Francisco.]

### NAVY'S ATTITUDE ON MAINE WRECK.

Regarding the proposition that the old battleship Maine be raised in Havana harbor the acting secretary of the navy has sent to R. H. F. Sewell of New Orleans, who addressed the department on the subject, a letter in part as follows:

"On July 1, 1902, the department stated its position respecting the wreck of the Maine in the following language:

"(This department is not at present engaged in, and does not contemplate undertaking any work upon the wreck of the Maine. It is not considered, however, that the navy department can, with propriety, in such case, give a letter or other papers which would be in the nature of credentials to be presented to the Cuban government; nor is it understood that any executive department of the government has the power in behalf of the United States to abandon the wreck of a public vessel. The disposition of the public property of the United States rests with congress, and this department would not undertake to give an acquittance or relinquishment of any rights of the United States in the wreck of the Maine, for the obvious reason that congress might thereafter, at any time, by enactment, direct that a different disposition thereof be made.)"

### CARGO RECORDS OF LAKE STEAMERS.

The steamers Augustus B. Wolvin and Sahara will in all probability before the year is out have the honor of holding first and second places as cargo carriers among the freight steamers of the great lakes. The Wolvin's latest record

breaking trip was from Escanaba to South Chicago when she carried 10,973 gross tons or 12,285 net tons of iron ore. The Sahara has just taken 8,411 gross tons or 9,420 net tons of iron ore from Duluth to South Chicago, and while this is not as great as the cargo of the Edenborn from Escanaba to South Chicago it is nevertheless the second largest cargo carried on the great lakes, draught considered. The second place is also held by the Sahara in soft coal records, that vessel having taken 8,906 tons 200 lbs. of bituminous from Lorain to Duluth. Of course,

the Wolvin has first place here with her record of 9,904 tons 1,800 lbs. of bituminous coal from Lorain to Duluth. Undoubtedly before the year is over the Wolvin and Sahara will have established grain records for themselves. Following are the cargo records to date:

Iron Ore—Steamer Augustus B. Wolvin, owned by Acme Steamship Co., A. B. Wolvin, Duluth, manager, 9,727 gross tons or 10,892 net tons, Two Harbors to Lake Erie; steamer Augustus B. Wolvin, owned by Acme Steamship Co., A. B. Wolvin, Duluth, manager, 10,973 gross tons or 12,285 net tons, Escanaba to South Chicago. Steamer Wm. Edenborn, owned by Pittsburg Steamship Co., Harry Coulby, Cleveland, manager, 8,807 gross tons or 9,864 net tons, Escanaba to South Chicago. Steamer Sahara, owned by Globe Steamship Co., G. A. Tomlinson, Duluth, manager, 8,411 gross tons or 9,420 net tons, Duluth to South Chicago.

Grain—Steamers J. H. Reed and D. G. Kerr, Provident Steamship Co., A. B. Wolvin of Duluth, manager, 275,000 bu. of wheat each, equal to 8,250 tons (2,000 lbs.), Duluth to Buffalo; steamer D. M. Clemson, Provident Steamship Co., Harry Coulby, Cleveland, manager, 336,365 bu. of barley, equal to 8,073 tons, Duluth to Buffalo; steamer Rensselaer, Pittsburg Steamship Co., Harry Coulby, Cleveland, manager, 151,000 bu. of wheat, 94,000 bu. of barley and 55,155 bu. of oats (300,155 bu. in all), equal to 7,668 tons, Chicago to Buffalo; steamer Mataafa, Pittsburg Steamship Co., Harry Coulby, Cleveland,



manager, 185,399 bu. of corn, 40,000 bu. of rye and 43,600 bu. of wheat (208,000 bu. in all), equal to 7,619 tons, Chicago to Buffalo.

Coal—Steamer Augustus B. Wolvin, owned by Acme Steamship Co., A. B. Wolvin, Duluth, manager, 10,569 net tons of anthracite, Buffalo to Milwaukee; steamer Augustus B. Wolvin, owned by Acme Steamship Co., A. B. Wolvin, Duluth, manager, 9,904 tons, 1,800 lbs. of bituminous, Lorain to Duluth; steamer Sahara, owned by Globe Steamship Co., G. A. Tomlinson, Duluth, manager, 8,906 tons, 200 lbs. soft coal, Lorain to Duluth; steamer James H. Reed, owned by Provident Steamship Co., A. B. Wolvin, Duluth, manager, 8,029 tons, 1,400 lbs. of soft coal, Toledo to Duluth.

### SITUATION AT HEAD OF THE LAKES.

Duluth, July 19.—Fire destroyed the Duluth dock of the Chicago, St. Paul, Minneapolis & Omaha road a few days ago, with loss of about \$325,000. Three tugs of the Great Lakes Towing Co. were also burned, one of them to total loss. In the burned house were, among other goods, twenty-seven carloads of flour from a Minneapolis company, en route east. The warehouse will probably be rebuilt of fireproof materials. So rapid was the spread of this fire that men on the tugs were obliged to jump into the water and swim to safety, and one was drowned. The house was 1,300 ft. long and the fire spread its entire length in less than 100 seconds.

Head of the lake wheat stocks are now reduced to 987,000 bu., of which 200,000 bu. are macaroni, the rest spring. Of this latter sales have been made the past week in considerable amount to eastern millers, for early shipment, and it is figured that only about 200,000 bu. are for sale or to be left here. Sales of 125,000 bu. for immediate shipment were made one day. This is a very small stock with which to supply the local and eastern milling trade till new wheat begins to come in. On account of a better demand for vessel room induced by sales of wheat for shipment, rates have advanced  $\frac{1}{8}$  and are now  $1\frac{1}{8}$  cents a bushel. None but line boats are taking any stuff.

G. L. Douglas, jr., agent here for the Western Transit Co., has bought the dwelling commenced by the late Capt. Smith of the Columbus. He is understood to have paid about \$5,750, and it will take several thousand more to complete the house, which will be a very fine and commodious home.

One of the Mutual Transit boats took out a load of 20,000 barrels of flour a few days ago and the movement from interior milling centers is picking up somewhat from week to week.

### AROUND THE GREAT LAKES.

A new clamshell unloader is being installed at the Pittsburg Coal Co.'s dock at Sandwich.

The work of constructing a new lighthouse on the east end of the west breakwater at Ashtabula has been started.

The elevators at South Chicago have laid off half their men. The force retained will take care of all vessels sent to that place for grain.

Daniel McLean, engineer of the tug Gillet, Duluth, was killed July 14 while at work on repairs of the tug by the falling of a crank shaft upon him.

The passenger steamer America of the A. Booth Line lost five cabins by colliding with the steamer Holmes of the Hawke & Co. at Duluth on July 19.

Fire caused by the explosion of a lamp on the steamer Eboa at Parry Sound, destroyed the upper part of the boat on July 14, causing a loss of \$1,000.

Mr. J. J. Joyce of Buffalo was re-elected first vice-president of the International Longshoremen, Marine & Transport Workers' association of Milwaukee.

The Bay City Dry Dock Co., through Mr. James DeGrace, has decided to locate a dry dock at Tonawanda just east of the Tonawanda Post & Shingle Co.'s dock.

As an evidence of extremely dull business the steamer

George N. Orr cleared from Chicago for Depot Harbor on July 12 with a cargo of one barrel of beer.

The Thompson Line tug Watson sank at her dock in Port Huron, July 12. The boat's seacock broke and she filled before the crew could do anything with her.

Capt. Klah of the life saving service at Houghton is selecting a site for the new life saving station at Eagle Harbor for which congress made an appropriation last spring.

The Baltimore & Ohio grain elevator at Eighty-seventh street and Ontario avenue, Chicago, was burned at a loss of \$350,000. The fire was caused by an explosion of dust.

Capt. George McCallum, last year with the trust steamer Corsica, has been appointed second officer of the passenger steamer Eastern States. He succeeds Al. Palmer, resigned.

As a result of a collision on July 19, between the steamer Seranton and a canal boat laden with paving stone, the Blackwell canal is blocked. One side of the draw is open but it is impossible for boats to get past.

The Pittsburg Coal Co. has cut off all shipments to the head of Lake Superior and will not be in the market for any more tonnage to Duluth or Superior until there is some improvement in the dock situation at these ports.

David B. Carpenter has been appointed receiver for the propeller Portage at Cleveland. The Portage will be sold as soon as repairs to her are completed at Toledo. The boat is owned by the Interlake Transportation Co.

The launch belonging to Judge C. H. Donnelly of Woodstock, Ill., was consumed by fire on July 19 on Lake Geneva, entailing a loss of between \$4,000 and \$5,000. The fire was started while the tank was being filled with gasoline.

The Wheeling & Lake Erie road has begun suit in Cleveland against the steamer Luzon for \$43,973, claiming that their Maumee bridge at Toledo was damaged to that extent by the Luzon, when she butted into the structure last season.

The government has dredged part of the channel at Grand Haven, Mich., to a depth of 22 ft., and has left the remainder untouched. On July 15 the steamer Pentland went on a bar 300 ft. outside the harbor entrance. She was released later.

The barge S. E. Marvin in tow of the steamer L. E. Hines sprang a leak in a heavy sea off the Apostle Islands Sunday morning and was towed to Washburn with her hold completely filled with water. Her cargo of pine lumber kept her from going to the bottom.

Daniel H. Wilcox, who has the contract for raising the cargo of the steamer W. H. Stevens which sank in the middle of Lake Erie, above Point Burwell in 1902, reports that the cargo will soon be raised and delivered in Buffalo. At the present time about 60 tons of the copper has been raised.

A crib was sunk east of the channel of approach to Conneaut Harbor, on June 11, 1904. Its outer end nearest the channel is 600 ft. from the light on the breakwater, and on a range N. E. by E.  $\frac{1}{2}$  E. therefrom. The top of the crib is below water level, and its outer end is marked by a spar buoy and lantern by night.

The annual report from the office of the United States engineer for Detroit is now being prepared by Lieut.-Col. Davis. There were but three wrecks last year, but this had no effect on the expenses, the heaviest in years, owing to the wreck of the steamer John N. Glidden in the St. Clair Flats canal. This wreck, the report states, was raised at a cost of \$41,837.

The senseless crowding of passengers to the shady side of the steamer Eastland on her return trip from South Haven to Chicago on Sunday night last caused a temporary panic on the boat. The steamer lacked her customary water ballast and the crowding to starboard gave the vessel a bad list. Strange to say, while the cause of it was perfectly apparent, the crowd refused to move until the fire hose was turned on them. This proved effective and the weights were properly distributed thereafter. But some of the women on board insisted on wearing life preservers until the boat reached her dock.



### UPBUILDING OUR MERCHANT MARINE.\*

By Col. J. J. Sullivan.

In this age of competitive strife, each one, if he would succeed, must stick to his trade. My business is banking and I cannot be expected to have more than an incidental acquaintanceship with shipping. It so happens, however, that in this city, where 80 per cent of the active tonnage of the great lakes is controlled, bankers have considerable to do with ship building. The latter-day members of the great fleet of vessels on the great lakes, which exceeds in tonnage the merchant fleets of any other nation except Great Britain and Germany, have been built largely upon bonds. Indeed it is a common practice for a ship to be bonded for half its value, the trust company having a lien upon the entire ship and its insurance as a security for the money advanced to the owners. These bonds pay 5 per cent and are to all practical purposes as good as government bonds. Why are they so? Because the government has guaranteed under the coastwise laws the integrity of the trade in which they ply. The staple business of the great lakes, when this great fleet of freight carriers is considered, is the transportation of iron ore. More than three-fourths of all the iron that is made in this country—and this country is the greatest iron making country in the world—is made from the ores of the Lake Su-

perior region. Practically every pound of that ore is, and must always be, transported to the furnaces of Ohio and Pennsylvania by water. These deposits are wholly within American territory and, therefore, the trade is exclusively reserved to the American ship. It is a trade, too, that must grow with the growth of the country, and while there may come an occasional year of depression, the scale must be normally an ascending one. Shipping and ship building on the great lakes, therefore, will continue to be a safe and wholesome business so long as the nation's laws concerning the coastwise trade remain unchanged. There is no question but that they will remain so, of course.

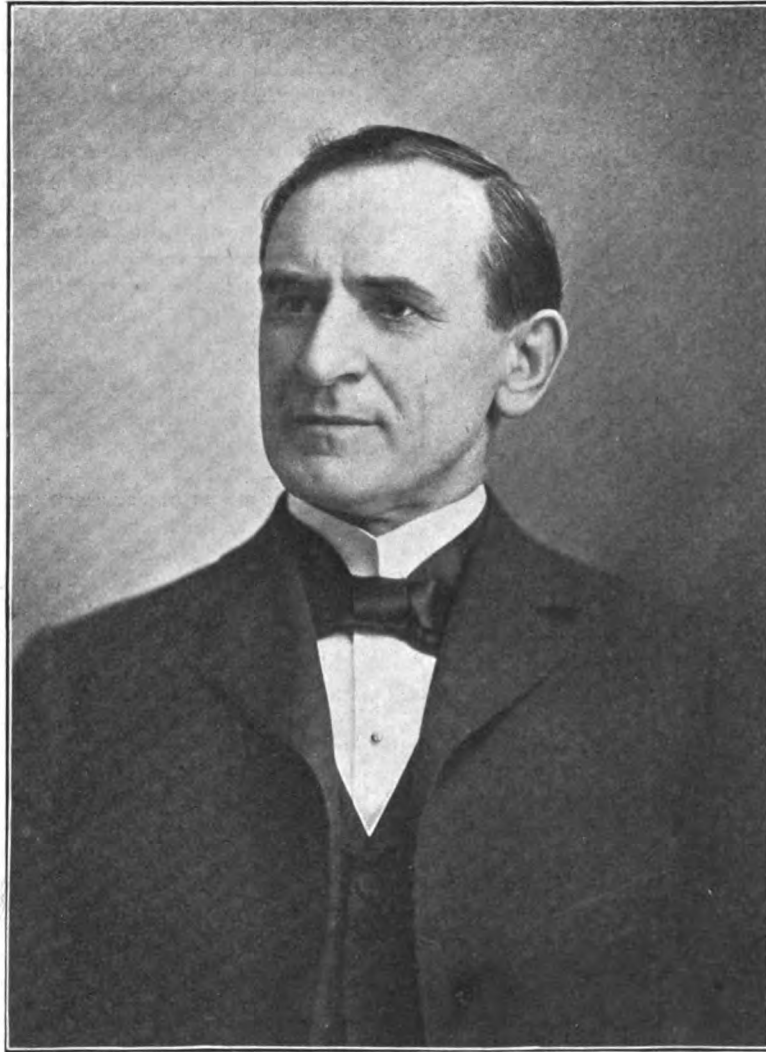
The conclusion is perfectly natural that if protection has done this for the shipping of the great lakes why may it not do likewise for shipping on the high seas? I have no remedies to advance to you, gentlemen, for any condition that may exist in the over-sea carriage of our products—only a few thoughts. This question of shipping does not appeal to me as a party

\*Address delivered before Merchant Marine Commission in Cleveland.

measure and I hope that politics will be eliminated from it altogether. Measures which have for their aim the upbuilding of the industries of the country appeal very widely to the great body of citizens, regardless of party affiliations, and are really supported by the citizens in general regardless of political ties. This is the temper in which I think the question of the revival of our shipping should be approached and I hope this commission will be favored with advices from men in all parties and all walks of life. The question is a national one and

should be nationally viewed. This country has grown great industrially because we have moved as a unit to make it so. It might be said that every single industry within our national jurisdiction has received the concerted aid of the whole nation—every industry save shipping. However small the individual industry may have been, it has received the aid of 70,000,000 of people. Perhaps some of these industries have received more aid than they needed. I am not prepared to say, but perhaps it is high time to take the swaddling clothes off some of them; but I am quite sure from some figures in my possession, and doubtless the common property of you all, that it is high time to put the swaddling clothes on shipping. When a man is full grown he does not need these sort of garments, but when he is an infant he needs them more than he needs anything else.

We are apt to point to the railroads as the great developing agencies of the United States, and so they have been; but have not the railroads been the recipient of enormous aids from the general government? Are not these enormous grants of land to the railroads in the nature of subsidies? Moreover, every business man knows what a blessing it is to have a fixed income which cannot be materially disturbed by the vicissitudes of business. Such an income have the railroads in the postal subsidies. During the past seven years the government of the United States has appropriated \$238,776,000 for railway mail carriage—and that without subjecting the railroads to the necessity of expending a single penny for railway car equipment, for the government has built the mail cars during the past seven years at a cost of over \$33,000,000. In contrast with these figures there is a rather pitiful sum of \$998,000 earned by American steamers for American ocean mail carriage. Of course, the government spent more money than this for ocean carriage of the American mails, but there were not enough



COL. J. J. SULLIVAN.

mail steamers in existence, flying the American flag, to earn more than this.

On the face of it it is a very strange thing that a country with a coast line of 10,000 miles and with an export trade of \$1,500,000,000 per annum should practically have no ships engaged in its foreign commerce. It is not so very strange, however, when one penetrates beneath the surface. It is really the logical outcome of conditions which obtain both at home and abroad. The condition at home is met with at every corner—a higher wage, a higher standard of living, higher costs and higher operating expenses as a result of that policy of protection which has been extended to every department of our industrial life, save shipping. The condition abroad is the unequal odds imposed upon American ships by subsidies granted to their rivals by foreign countries. Witness that Britain pays \$900,000 a year in postal subsidies and admiralty subventions; that France pays over \$7,000,000 for the same purpose; Germany over \$2,000,000 and little Japan has lately begun to pay over \$2,500,000 as against \$908,000 paid by the United States. These subsidies in the case of Great Britain were paid for the carriage of mails by ocean steamers to all quarters of the earth. For what purpose was this done? To establish trade, of course. Trade cannot precede the mail. What has been the result of this policy definitely clung to by Britain for over forty years? It has extended her trade to all quarters of the earth, in many a part of which it has given her an absolute monopoly since she is the only country having steamers reaching those parts. With these countries it would be as useless for us to attempt to extend our trade in manufacture as it would be for me to expect to get business through the commercial agent of another bank. Trade to outlying countries can only be pushed by American branch houses in direct communication through American ships with the parent house. Blood is thicker than water and given the opportunity a British ship will work for a British house in preference to that of any other nation. Thus it is that the British manufacturer can beat us in the South American market—a part of our own continent. The great need of South America is agricultural machinery, yet every American reaper and every American harvester must first be dumped on Liverpool docks before it can reach the South American consumer. What chances do you suppose it will stand over there if it comes in competition with a similar product of British manufacture?

Therefore I say this question of over-sea shipping is one which concerns us as merchants and manufacturers. We should keep our export trade as nearly as we can within our own hands for the benefit of our own merchants and manufacturers. I really think the entire country is in the proper temper for this as was presaged by the last congress extending the coastwise laws to the Philippines after July, 1906, and directing that all army and navy supplies should be forwarded there in American bottoms.

It is not the purpose of the layman to point out the remedy and I think the Republican national convention recognized this very clearly last week when it approved the principle of aid and left the form of its application to the members of this commission.

Gentlemen, I hope you will do your duty for the merchant marine of this country. I don't believe there is a more vital issue before the nation today.

#### DEVELOPMENT OF THE SCHOONER.

Following is the chronology of the development of the schooner or sailing craft:

1714—First two-masted, fore-and-aft vessel, ever constructed in the world, built at Gloucester, Mass., by Capt. Andrew Robinson. She was an innovation on anything ever before seen in the history of a vessel, incidentally giving Andrew Robinson much perplexity as to its designation. On the day of the launching, happily for the builder and the world at large, the

problem was solved by a bystander who observed, as she slid into her home: "How she schoons!" "If she schoons she must be a schooner," remarked the builder.

1849—First three-masted schooner ever constructed, the Zachary Taylor, built at Hanover street wharf, Philadelphia, by Matthew Vandusen, for Capt. James A. Mershon, father of Charles Mershon, the Walnut street ship broker. Her mizzenmast was much shorter than the other masts. She loaded a cargo of cars, engines, machinery, small boats, etc., for Chagress, a port near where Aspinwall is now located. She ran for two years, and was lost in Delaware bay. She was about 250 tons register and carried 375 tons of cargo.

1849—Second three-masted schooner, the Spray, built at Wilmington, Del., for Capt. Isaac Cathcart. She had a long mizzenmast, just as the present three-masters have. She loaded for California and was sold out there.

1866—Largest two-masted schooner, the Oliver Ames, 450 tons register, built at Berkley, Mass.

1880—First four-masted schooner, the W. L. White, built at Bath, Me., by Goss Sawyer and Packard for Jacob B. Phillips of Taunton, Mass. She registered 905 tons gross, and was the largest vessel of her class at that time in the world. She was a four-master by accident, for she was originally designed for three masts, but it was thought that they would be too unwieldy, and so the fourth mast was added.

1181—Second four-masted schooner, the Francis C. Yarnall, built at Wilmington, Del.

1882—First schooner over 1,000 tons register, the Ellicott B. Church, built at Bath, Me. She registered 1,137 tons and was a four-master.

1882—Second schooner over 1,000 tons register, the Augustus Hunt, built at Bath, Me. She registers 1,200 tons, is still afloat and has four masts.

1884—Largest three-masted schooner ever constructed, built at Kennebunk, Me., the Bradford C. French, 908 tons gross.

1884—First schooner over 1,300 tons register, built at North Weymouth, Mass. She was the Haroldine, 1,361 tons register, and was a four-master.

1886—Second schooner over 1,300 tons register, built at Bath, Me. She was the Sarah W. Lawrence, 1,369 tons register, and had four masts.

1887—First schooner over 1,600 tons register, built at Bath, Me., the T. A. Lambert, 1,630 tons register. She had four masts.

1888—First five-masted schooner, the Gov. Ames, built at Waldoboro, Me., 1,778 tons register.

1890—First schooner over 1,800 tons register, built at Bath, Me., the William B. Palmer, 1,805 tons register; has four masts.

1897—First schooner over 2,000 tons register, built at Bath, Me., the Frank A. Palmer, 2,014 tons register, and up to date is the largest four-master ever built.

1898—Second five-masted schooner, the Nathaniel T. Palmer, built at Bath, Me., 2,440 tons register.

1899—Third five-masted schooner, the John B. Prescott, built at Camden, Me., 2,454 tons register.

1900—First schooner over 2,600 tons register, the William C. Carnegie, built at Bath, Me., 2,663 tons register; five masts.

1900—First six-masted schooner built at Camden, Me., the George W. Wells, 2,970 tons gross register.

1900—Second six-masted schooner, the Eleanor A. Percy, built at Bath, Me., 3,401 tons register.

1901—Five-masted schooner Baker Palmer, built at Waldoboro, Me., 2,702 gross tons register.

1902—Five-masted schooner Prescott Palmer, built at Bath, Me., 2,811 gross tons register. Largest five-master afloat.

1902—Seven-masted steel schooner Thomas W. Lawson, built at Quincy, Mass., for the Crowleys. First seven-masted vessel in the world and the first steel schooner ever built in America; capacity 8,000 tons of cargo.



## ITEMS OF GENERAL INTEREST.

Thomas H. McManus, naval architect of Boston, has designed a 130-ton vessel for Cunningham & Thompson, which is to be built by James & Tarr of Essex, Mass.

T. M. Cook has been appointed collector of the Panama canal zone. He has already sailed to the zone and will proceed direct to Panama to organize the customs service in the zone.

The trial trip of the battleship Ohio, built by the Union Iron Works, San Francisco, will occur during the present month. The Ohio's battery is on board and it is expected that she will go into commission next month.

Orders for Babcock & Wilcox boilers have been placed by the Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa., for the battleship Idaho and Mississippi. Each vessel is to have 10,000 H. P. in eight units.

The three-masted schooner Flora A. Kimball was launched from Sawyer Bros.' yard, Millbridge, Me., July 12. Her dimensions are: Length, 140 7-10; beam, 32 3-10; depth, 11 4-10; gross tonnage, 401.70, and net tonnage, 321.35.

The contract for repairing the revenue cutter Galveston has been awarded to the William Cramp Ship & Engine Building Co. The work contemplates the installation of new engines and boilers and the remodeling of the vessel's stern.

The four-masted schooner Wm. J. Quillan, building for Capt. Rowland F. Quillan of Bethel, Del., was launched last week from the yard of the New England Ship Building Co., Bath, Me. The Quillan is 176 ft. long, 37 ft. beam and 13 ft. deep.

M. B. Macdonald of Mystic, Conn., launched the schooner George E. Klinck on July 5. Capt. George Thomas of Gloucester, Mass., will command her. The general dimensions of the vessel are 147 by 12½ ft., and her carrying capacity is 850 tons.

The torpedo boat Flakely built by George Lawley & Sons, East Boston, Mass., was given a builders' trial last week over a measured course and exceeded her contract speed of 25 knots, covering the course with an average speed of 25.6 knots per hour.

It is reported by cable that the White Star Line has given a contract to Harland & Wolff, Belfast, Ireland, for a new steamer to exceed the Baltic by 4,000 tons to come out next year. The Baltic is now the largest vessel in the world, having a tonnage of 24,000.

Mr. F. Herriman, 79-85 Wall street, New York, has been appointed manager of the Atlantic marine department of the Firemen's Fund Insurance Co. of San Francisco and manager and attorney of the United States branch of the Union Marine Insurance Co., Ltd., of Liverpool.

H. M. & R. L. Bean, Camden, N. J., have two five-masted schooners on the stocks for the Coastwise Transportation Co. of Boston. One of them is 240 ft. keel, 48 ft. beam and 24 ft. deep and will carry 4,500 tons of coal. The other is 207 ft. keel, 48 ft. beam and 27 ft. deep and will carry 4,500 tons of coal.

The French ironclad Furious of 5,000 H. P. underwent her preliminary trial at Cherbourg lately, which was declared to be entirely satisfactory. A horse power of 3,500 was generated with a consumption of 89 kilos of coal per meter per hour. The work of the generators of the Belleville type was economical and excellent.

The steamship San Jacinto of the Mallory Line was damaged to the extent of \$40,000 by fire while lying at Roach's Ship Yard, Chester, Pa., where she was undergoing repairs. The San Jacinto was built at Roach's about a year ago at a cost of \$750,000. She is 404 ft. over all, 379 ft. between perpendiculars, 52 ft. beam and 31 ft. deep.

The Cunard liner Coronica was launched last week from the yard of John Brown & Co., Clydebank, Scotland, and was christened by Mrs. Joseph H. Choate, wife of the American ambassador, the only Cunard steamer to be so distinguished. The Coronica is the largest vessel ever built in Great Britain,

though of course Harland & Wolff of Belfast, Ireland, have built larger ones. She is of 21,000 tons displacement.

It is reported that the Toyo-Kisen-Kaisha is in the market for two steamers to take the place of the Hong Kong Maru and the Nippon Maru, lately withdrawn from service as government transports. The company would rather charter the steamers if it is possible to obtain them, but if not, will place orders for the construction of two 12,000-ton vessels.

Wm. Arms and William Fetterly of Traverse City, Mich., are building one of the largest cruising launches operated by a gasoline engine ever made in Michigan. It is 53 ft. long, 51 ft. on water line, and is equipped with a Fairbanks-Morse gasoline engine of three cylinders, four-cycle type, driving a 34-in three-blade propeller. The launch will go to New Orleans via Chicago canal and the Mississippi river in the fall.

M. N. McLellan of New York has had built for him by the White Craft & Power Co., Port Richmond, S. I., a speed boat 32 ft. over all by 5 ft. 10 in. beam. She was constructed from the builders' own design and is equipped with a 16-24 H. P. Truscott 4-cycle high speed gasoline motor. A speed of 12½ miles per hour was developed on the day of launching without any preliminary "tuning up" of the motor, which ran at a speed of 1,140 revolutions per minute.

The new steel steamship Ontario, building for the Merchants' & Miners' service between Baltimore and New York will soon be ready for service. This steamer is being built by the New York Ship Building Co. at Camden, N. J. The Ontario cost about \$400,000. She has four freight and two passenger decks. Her length is 315 ft., beam 42 ft. and depth of hold 34 ft. She is finished in mahogany and antique oak. She is a single screw propeller with triple-expansion engine.

Ralph J. Venning, formerly advertising manager of the Cleveland Punch & Shear Works Co., has accepted the position of secretary of the Citizens Transit Co. of Cleveland. This company has been formed to operate a line of electric passenger tonneau cars on the streets and boulevards of Cleveland, using the Berg-Ledwinka type of motors and the Edison storage battery. Mr. Charles Berg who controls the patent rights on this equipment is president and general manager of the company.

There has lately been placed on the San Francisco market the Cushman two-cycle engine, for which Sykes & Corson are the agents. The engine appears remarkably light, simple and effective. It is intended to equip a light draught boat for racing purposes with a Cushman motor, made by the Cushman Motor Co. of Lincoln, Neb. The Rudder of New York built the speed launch Dolphin and equipped her with this motor. When going at 12½ miles an hour the Dolphin shows "a clear, unbroken entrance; a flat, smooth wake; an almost total absence of wave; no lifting forward and no squat aft, any one of which is an enemy to speed." The dimensions of the engine are 5-in. diameter piston, 5-in. stroke, 200 lbs. weight; an 18-in. propeller of two blades with a 19-in. pitch makes 720 revolutions per minute. The engine has a jump spark ignition and runs in either direction; it develops about 7¼ H. P., but if the pitch of the propeller is made about 17½-in. it will permit the engine to make 800 revolutions per minute, at which it will develop 8 H. P. The Dolphin has not a curved timber in her; everything except the keel and coaming is straight and easy work. The cost of material for the whole hull, complete with grass fastenings, screws, etc., was \$85. The hull was built for The Rudder by L. D. Huntington, Jr., of New Rochelle, N. Y. The Dolphin would be a fast boat even with less power. It is wonderful to see her fly past ordinary power boats and even run alongside large steam yachts. Yet the engine is under wonderful control, and can be run slowly enough to keep alongside the ordinary launch. Though she is a racing machine, intended simply for speed and not for rough waters, she will go into the swell of a big steamer without wetting her decks or diminishing to any apparent extent her speed.

**BRITISH NAVAL ESTIMATES - OIL FUEL.**

The navy estimates of the British government for the coming financial year provide for an increased ship building program and amount to £36,889,000, as against £34,457,000 for the current year. The amount proposed in the estimates for 1904-5 for new construction is £11,654,176, of which about one million is for the completion of the purchase of the Chilean battleships, and £642,083 will be devoted to the commencement of new ships. The commencement of two battleships, four armored cruisers, fourteen torpedo-boat destroyers and ten submarines are provided for in the ship building program, while the increase in officers and men for next year is put down at 4,000. At the present time there are building eight battleships, thirteen armored cruisers, one second-class cruiser, four third-class cruisers, eight scouts, twenty-three destroyers, eleven submarines, one river gunboat and a new admiralty yacht, while during the coming year it is expected the following ships will have been completed and passed into the fleet reserve: Three battleships, five armored cruisers, one second-class cruiser, four third-class cruisers, eight destroyers, ten submarines, one river gunboat and the new admiralty yacht. The purchase of the two Chilean battleships, named the *Swiftsure* and the *Triumph*, at a cost of £1,875,000, has necessarily modified the program, and accordingly parliament is to be asked to approve of the commencement of two new battleships instead of three and of their commencement in the autumn instead of April. The battleships of the 1904-5 program will be given out to contract and will be the first ships of a new design, which will be known as the Lord Nelson class. The policy of completing in every respect in private yards the ships built in private yards, and of effecting repairs in private yards, has been wholly successful. The experiments with oil fuel have continued without a day's interruption, and Lord Selborne thinks it can be accurately stated that in no other country has greater attention been given to this subject, or the experiments been more exhaustive. The progress has been slow but sure; the great difficulties connected with the satisfactory use of oil in ships of war can only be overcome by patience and continual experiment; the experience gained with the *Mars* and *Hannibal* in the Channel fleet with their cylindrical boilers has been utilized in respect of the Belleville boilers of the *Bedford*, which has now been commissioned for service in the Channel fleet. Simultaneously with the experiments in the use of oil fuel, the question of its storage and supply is being carefully studied. The publication of these estimates has been closely followed by the announcement that the admiralty have accepted contracts for armor plate, and placed orders with the three manufacturing firms of Messrs. Vickers, Sons & Maxim, Messrs. Cammell, Laird & Co. and Messrs. John Brown & Co. Other orders, it is said, have been given out to Messrs. Armstrong, Whitworth and Messrs. William Beardmore.

**DEVELOPMENT OF THE SHIP.**

Concerning the development of the ship Henry W. Bourne, president of the Old Dominion Line, said:

"If we follow along down ancient history we find that very little improvement had been made in ships until the eighteenth or nineteenth centuries. Noah's ark was what we should call a house boat, and could only drift, and the ship used by St. Paul when he was cast away upon the Isle of Rhodus, although they had learned the use of the rudder and could propel her by sails, differed but little from the ark, for we learn that he cast four anchors out of the stern, which indicates that she would ride as well one end to the sea as the other. The ships used by Columbus, the *Santa Maria*, *Pinta* and *Pinta*, were but little better. The *Mayflower* was of the same class, but a little improved; but when we get down to the present century the development was rapid. Even

within my recollection transportation throughout Massachusetts was performed by large baggage-wagons—four-horse teams—and I remember distinctly listening, in the southwestern part of Massachusetts, fifty years ago to a discussion as to what was going to become of people engaged in that business—running express wagons—when the railroads were built; that the men would have nothing to do and the horses would find no market; but the men found more profitable employment and horses continually advanced in price. The west was covered with baggage-wagons of this kind until the railroads drove them out. Trains of wagons—'prairie schooners'—were picturesque, but less profitable than the railroads and rendered but inefficient service. Water transportation at that time was better than by land; the old vessels running between here and Liverpool, and on the coast, rendered good service, but they were superseded by steamers. If you compare the service rendered then on the land with the service at that time on the water and the advancement made by both classes of transportation since, you will find that the railroads have overtaken the water lines; they have made far longer strides in improvement than we have. Our railroad friends have outstripped us; they are closer students of the needs of the public—they anticipate their needs and they have their reward. The result is that the railroads today have absorbed nearly all the transportation of this country."

**PUZZLE-FIND THE AMERICAN FLAG.**

The following is a return of the navigation through the Suez canal for four weeks ended June 17, showing the number of vessels coaled under the various flags and the amount of tonnage:

	Number of vessels.	Amount of tonnage.
Austrian .....	8	28,527
Belgian .....	1	2,414
British .....	187	633,476
Danish .....	2	7,713
Dutch .....	18	46,536
French .....	20	63,242
German .....	32	120,119
Italian .....	10	28,876
Norwegian .....	1	671
Spanish .....	2	7,556
Turkish .....	1	1,383
	282	940,513

**PERSONAL.**

Capt. James M. Todd, assistant United States inspector of hulls, and William P. Nolan, assistant inspector of boilers of the local department at Buffalo, have been ordered to New York to assist in the inspection of the vessels in that harbor.

Capt. Apfeld, the veteran commander of the steamship *Waesland* when she was run down and sunk without the loss of a single life while bound from Philadelphia to Liverpool, has been promoted to the command of the *Red Star* liner *Finland*, a larger and finer vessel than he has ever before commanded.

**OBITUARY.**

Capt. Oscar A. Maxwell died at his home at Ashtabula last Sunday afternoon. He had been on the lakes for thirty-three years.

Capt. John H. Gillette, of Marquette, Mich., died on July 12. For many years he was a leading tug boat man at Marquette harbor. He had lately resigned from the United States customs service.

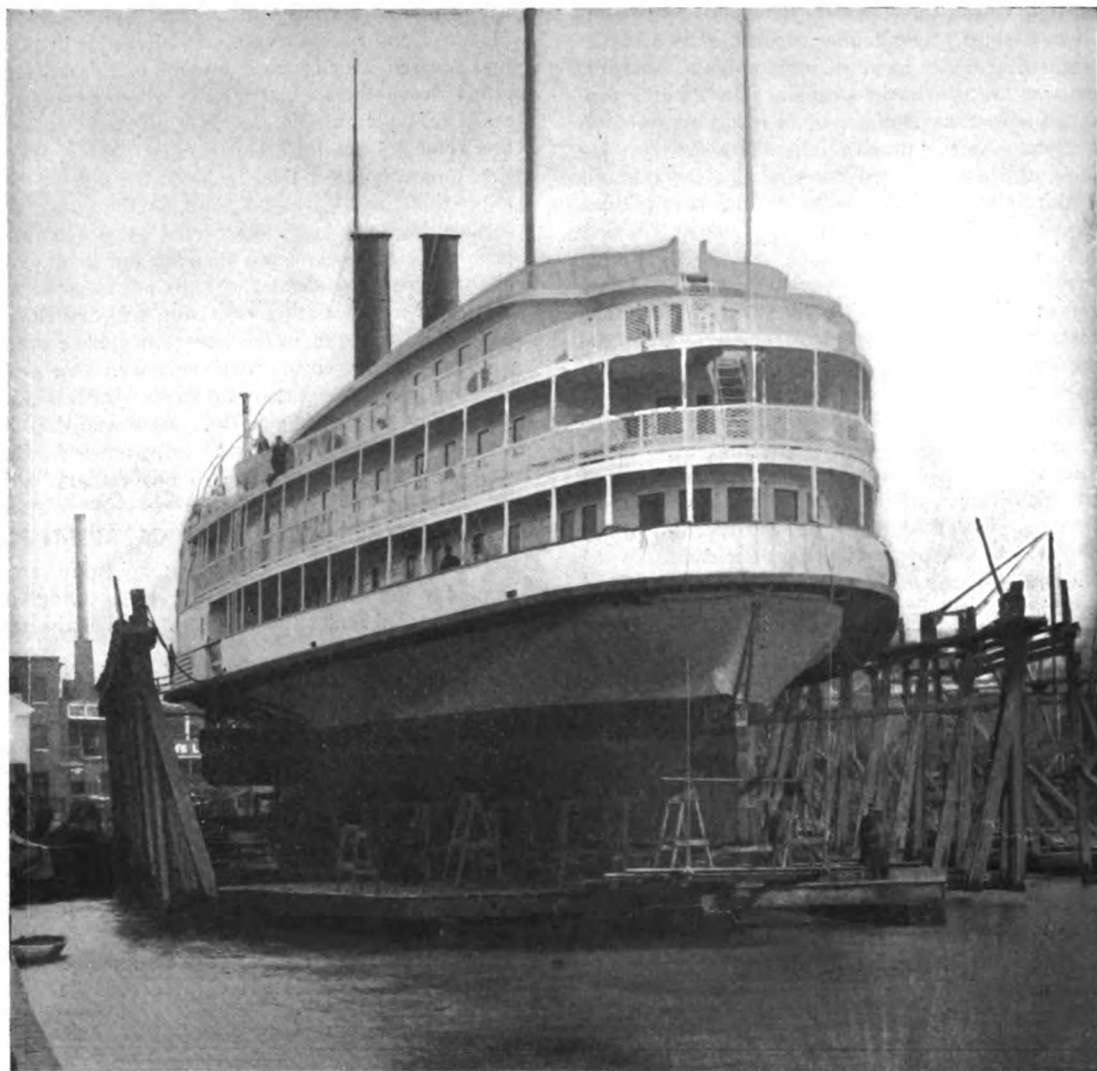
A breakwater will be constructed in West London, Ont., at a cost of \$35,000.



### RAILWAY DRY DOCK.

The marine railway has been developed into the railway dry dock by the H. I. Crandall & Son Co., the well-known dry dock engineers of East Boston, Mass. It is claimed that not only does the railway dry dock offer the best facilities for repairing a ship, but they are also less expensive to build and

only water connection between Chicago and St. Louis is via the Old Illinois & Michigan canal, in which the depth at present probably does not exceed  $4\frac{1}{2}$  ft., and that so precarious that no vessel should attempt to navigate it unless piloted by a person familiar with the canal. The locks are 110 ft. long by 18 ft. wide. The canal extends from Chicago to La Salle, on



RAILWAY DRY DOCK BUILT BY H. I. CRANDALL & SON CO., EAST BOSTON, MASS.

operate than any other kind. The Messrs. Crandall & Son Co. now have two under construction, one at Manila, P. I., of 1,400 tons capacity, and one at Victoria, B. C., of 3,000 tons capacity. They have also recently secured contracts for three others, one of 5,000 tons capacity at Oakland, Cal.; one of 600 tons capacity in Mexico and one small one of 300 tons capacity at Portland, Me. The accompanying illustration shows one of these railways of 2,000 tons capacity.

### NAVIGATION FROM CHICAGO TO ST. LOUIS.

Very frequently the question is asked of the Review as to how a launch or small vessel might get from Chicago to the Mississippi river and the writers are usually of the opinion that the new drainage canal can be used. The following letter from Col. O. N. Ernst, government engineer at Chicago, will answer the query:

"In reply to the inquiry contained in your letter of the 14th instant, you are respectfully informed that the new drainage canal terminates with the controlling works at Lockport, and has no navigable connection with the streams below. The

the Illinois river. Below La Salle there is a depth of low water of about 7 ft. as far as the Mississippi river. Between the mouth of the Illinois river and St. Louis the depth at low water probably does not exceed 5 ft."

During the past two weeks the steamer Inland Flyer of the Port Orchard route, out of Seattle, has been using oil for fuel with success. Joshua Green, president of the La Conner Trading & Transportation Co., owners of the Inland Flyer, says that he is perfectly satisfied with the experiment and sees no reason why oil cannot be as successfully used in small vessels as in large ones. He thinks that the saving in expense amounts to about 15 per cent over coal.

The fittings and machinery of the new battleship Nebraska which is building at the yard of Moran Bros. & Co., Seattle, Wash., are being installed and the upper house is now being put on. The launching ways have been completed and it is possible that the Nebraska will be launched about the first week in October.

### WE MUST HAVE SHIPS.

"Our trans-continental railroads are the fruit of wise, though severely criticised, legislation. We are fast acquiring a navy to be proud of, and are fast becoming proud of the navy we have. Yet the American people are willing to pay the price—I believe that they are willing to pay the price of a merchant marine. Let us hope that before congress adjourns a committee will be created to investigate the subject. Let us hope that at the convening of the next session this commission will file a well-considered report. Let us hope that hereupon such action will be taken as in the wisdom of congress shall be deemed appropriate. The end is of such far-reaching importance as to justify the most painstaking investigation and the most fearless statesmanship."—Secretary Shaw.

New Steamers for the Hamburg-American Line.—The Hamburg American Packet Steamship Co. has ordered two new steamers to be constructed by the Reigerstieg ship building works of Hamburg. One of these vessels is intended for trips to the West Indies, and is to be 350 ft. long and 43 ft. wide, with a capacity of 5,000 tons. The other is to make trips to the west coast of America, and is to be 410 ft. in length, 45 ft. in width and of 7,000 tons capacity. Both steamers will carry freight and passengers.—Richard Guenther, consul general, Frankfurt, Germany, Jan. 30, 1904. Not a whisper is heard of any ocean-going American ships being built.

We are sending into foreign lands nearly \$5,000,000 worth of American commodities and products every day, of which less than 9 per cent are carried upon American bottoms, and during the year 1903 the tribute paid to foreign ships for carrying merchandise to and from the United States amounted to more than \$100,000,000.

The following table shows how the tonnage of fleet registered for deep-sea commerce of the United States compares with that of other nations:

	Tons.
United States .....	873,000
Italy .....	1,180,000
France .....	1,480,000
Norway .....	1,600,000
Germany .....	2,000,000
British Empire .....	14,800,000

Of a most interesting nature is the return issued this week regarding subsidies given by the British government to British steamship companies. The Cunard company comes first with £229,881, the other amounts being: The Oceanic Steam Navigation Co. (White Star Line), £185,970; Peninsular & Oriental Co., £101,375; Inman Steamship Co., £26,000; Royal Mail Steam Packet Co., £7,117; Orient Steam Navigation Co., £7,000; and The Pacific Steam Navigation Co., £4,885.

America's Shipping Increase is Small.—Lloyd's Register of Shipping for the year 1903, which has just been issued, shows that the total addition of steam tonnage during the year has been 1,608,736 tons gross, and of sailing tonnage 34,595 tons gross. It includes a statement showing the countries for which the vessels have been built: 749,050, or nearly 60 per cent, have been built for the United Kingdom, and 350,169 tons, or 21 per cent for other countries. Among the latter Germany leads with 62,508 tons; the United States has 45,529 tons; Austria-Hungary has 38,853 tons; Italy, 34,763 tons; Japan, 25,848 tons; France, 25,602 tons, and Norway 24,506 tons.

During 1903 forty steamers of over 5,000 tons each have been added, as compared with thirteen in 1892, twenty-four in 1897, sixty-one in 1900, forty-seven in 1901, and fifty-nine in 1902. Of these forty, four belong to the United States, two to France and Germany; one each to Austria-Hungary and Japan, and the remaining thirty to the United Kingdom. The largest steamers included in the return are the Carpathia, 13,-

555 tons; the Armadale Castle, 12,973 tons, and the Marmora, 10,509 tons.

If our flag and our vessels are to continue to disappear from the oceans during the next few years as they have in the past ten, there will not be one left to engage in the foreign trade when the Panama canal is finished. They will all have disappeared for years and years before that time, even if it is completed in the eight years predicted by some of the Panama enthusiasts. It is a duty which the nation owes to capital which has honestly gone into American shipowning. What would this nation be without ships? Why should it not, therefore, encourage American shipping whenever it can?—Nautical Gazette.

Prince Bismark said: "The merchant service is the hand-maid of all other industries, and of agriculture, manufactures and commerce. On the day when the freight trade is given over to foreigners a mortal blow will be dealt to all the industries of the country."

According to the report of the bureau of statistics of the department of commerce and labor for the fiscal year of 1902, our total exports to Europe in that year amounted in value to \$907,614,762 (almost a billion dollars), of which enormous amount but 13½ per cent was carried in American vessels, 98¼ per cent being transported in ships of other countries. We imported from Europe goods to the value of \$176,027,150, and of this but a little over \$30,000,000 worth was carried in American ships. Of the total imports and exports for the year from and to Europe, amounting in value to the vast sum of \$1,472,591,921, only 3¼ per cent was carried by American vessels.

WALTER J. BALLARD.

Schenectady, July 18.

### THE DULUTH STOKER.

The Duluth stoker, manufactured by the Duluth Stoker Co., Duluth, Minn., which has been tried successfully in a number of lake vessels, consists essentially of a set of grate bars carried from front to back of furnace over a number of fair leaders by two endless chains, one on each side of the furnace. At the back of the furnace the chains and bars pass over a drum and thence back over fair leaders to the front of the furnace again. At the front of the furnace the chains pass over sprockets, from which they receive motion. The bars each have two wrought iron lugs on lower edge, which hook into the chain, alternate bars hooking in from opposite sides. The upper faces of the bars are toothed and lock into each other, leaving sufficient opening to form air spaces for burning the coal.

From this construction it is evident that a bar can only be removed and replaced when it is passing over the sprocket wheel in the front of the furnace, for at no other time will the teeth be entirely disengaged from each other. The sprockets at the front of the furnace which give motion to the chains and bars, may be driven by any suitable device, but as the motion is very slow, worm gearing is best adapted for this purpose, the worm gear being driven by a small oscillating engine, immediately above the box containing the gearing, thus making a very compact and simple arrangement. At the front of the furnace also a hopper extends the whole width, into which the coal is shoveled. On the boiler front, and forming the back of the hopper, is a distributing and regulating plate, which extends across the full width of the grate, and is carried above it to whatever thickness is desired to carry the fire. At the front of the furnace, and extending back about one-third the length of the furnace, is a brick arch, and at the back there is an apron plate through which are a number of openings to allow a supply of air to enter over the fire. The speed of the bars from front to back is so regulated that coal shall be entirely consumed in the passage, and the speed will, of course, vary with the draft and thickness of the fire carried. The ashes and clinkers are dumped into an ash pan at the back end of the furnace.



### MEITZ & WEISS MARINE KEROSENE ENGINE.

The desirability of using in an internal combustion motor the safe oil, such as kerosene, the distillates and various grades of fuel oil as have been satisfactorily accomplished with the Meitz & Weiss stationary engine, is of perhaps greater importance in the propulsion of launches and other small craft both for pleasure and business purposes. It is claimed by August Meitz, 128 and 138 Mott st., New York, that the difficulties which have attended the use of the heavier oils for motor power,

either afloat or ashore, have been overcome in the Meitz & Weiss engine and that its possibilities promise a wide field in marine propulsion. Accompanying this article is an illustration of a Meitz & Weiss single-cylinder marine kerosene engine. The peculiarity of the oil feeding system, which is adapted to engines of any number of cylinders, is based upon the principle of injecting the oil into the compression spaces

from a single pump, the distribution and timing of the injection being in accord with the differences in pressure existing at the moment of the injection stroke of the pump. The great advantage of this arrangement lies not alone in its simplicity, but also in its equal proportioning of the quantity of oil delivered to each cylinder under varying loads. The governor is of the centrifugal type and is stated to be unaffected by the rolling of the boat. It consists of a rotating centrally pivoted weight, carrying an eccentric which operates the pump plunger once for each cylinder. The oil consumption is said to be slightly more than one pint per brake horse power per hour. The cranks are opposite to each other, thus giving two impulses for each turn of the shaft. The lubricating system is the same as in the stationary engines built by the same makers, the oil being fed by suction from a single reservoir placed below the point of feed. The main bearings of the engine are not lubricated from this system but are of a special ring oiling type. The thrust of the propeller is taken up by a ball bearing placed between the reversing clutch and the after main bearing of the engine.

The reversing gear is of an entirely new design. A short reversing shaft extends into the reversing clutch, and embracing this reversing shaft and forming its principal bearing is a brass sleeve passing through a bracket upon the reverse lever fulcrum plate and rigidly secured thereto, so as always to remain quiet without rotating. Rigidly fixed to the forward or left hand end of the shaft is the coned friction driving disk by means of which the propeller is always turned. The after end of the crank shaft extends through the ball bearing in suf-

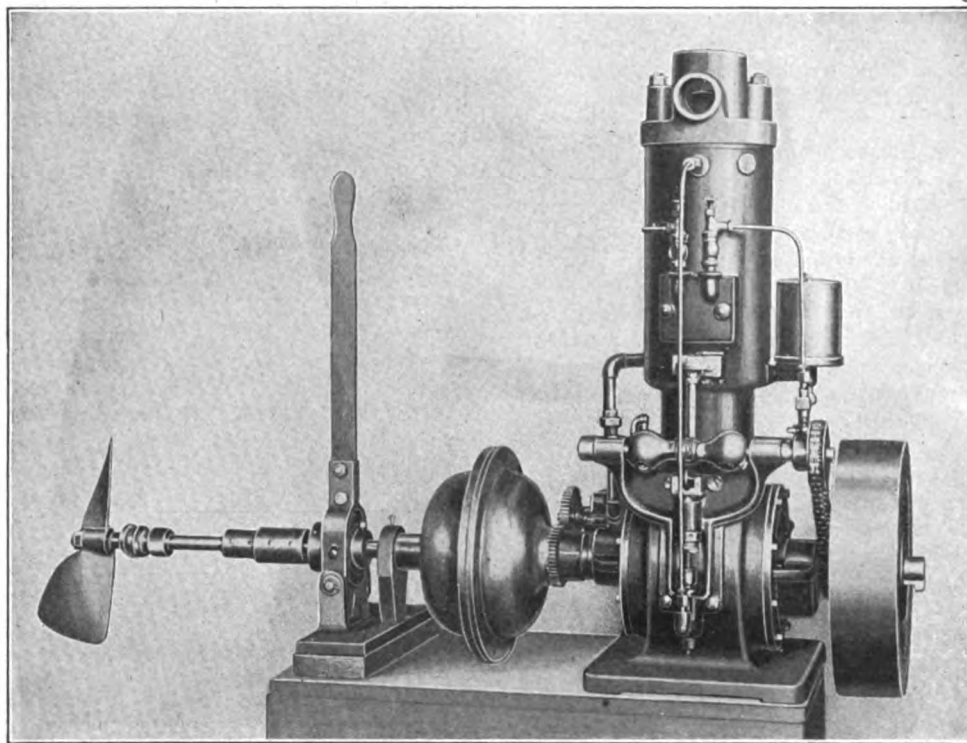
ficient distance to receive the hub of the forward half of the reversing clutch case. Fitted to this forward half by male and female flange connection in the rear portion of the case, its hub having a bearing upon the fixed central sleeve embracing the reversing shaft. This case complete rotates continuously with the engine. The interior of each half is turned conical in form. The short reversing shaft is allowed a slight movement fore and aft and may throw the main driving disk attached to the end of the reversing shaft into driving

contact with the forward half of the casing. The propeller is then driven in the same direction as the engine from the forward half of the case through the driving plate to the reversing shaft, and thence to the propeller shaft. This direct driving gives the forward movement to the boat. The forward movement of the reverse lever to give this direction or motion is therefore entirely logical.

For motion

astern the reverse lever is thrown so as to reverse the motion of the propeller while that of the engine remains as before. Mounted upon studs screwed into the fixed sleeve nearly centrally within the reversing gear case are bevel pinions, meshing with corresponding bevel gear teeth cut upon the backs of the driving cones. The gears run loose upon the sleeve and, being always in mesh with the beveled pinions, must necessarily rotate in opposite directions when turning at all relatively to the sleeve upon which they are mounted. Movement of the reverse lever to the right withdraws the main driving plate from contact with the forward half of the casing and brings its interior conical surface into contact with the exterior of the left hand of the two reverse motion cone gears and at the same time forces the right hand of these gear cones into contact with the conical interior surface of the after or right hand half of the case. The sleeve, as well as the reversing shaft, is allowed a slight movement fore and aft to accommodate its motion. In this case the driving of the propeller in the direction opposite to that of the engine is plainly accomplished from the rear half of the casing to the right hand geared cone, thence to the reverse motion cone through the bevel pinions and finally to the main driving disk as before. The thrust collar with which the reverse lever engages to give the fore and aft movement of the reversing shaft is fitted with ball bearings.

It will be noted that the thrust of the propeller in forward motion exerts its entire force directly against the frictions so as to keep them in driving contact without the assistance of toggle levers or cams, the whole connection from engine to propeller acting as one solid shaft. On the other hand, when



SINGLE CYLINDER MARINE KEROSENE ENGINE.

the propeller is reversed its tension upon the shaft exerts its force to hold the reversing gearing into driving contact in the desired direction. A central position of the reversing lever disengages the shaft entirely, so that the engine may continue to run idle while the propeller remains at rest. The case or frame enclosing the reversing mechanism is quite tight. The friction surfaces are metallic and are stated to be large in proportion to the power to be transmitted. One of the advantages claimed for this clutch over the ordinary toggle lever device is the fact that the pressure creating the friction constituting the driving force varies with the power required and corresponds to the thrust of the propeller. In consequence the thrust is said to pick up its load very gradually, since the thrust of the propeller against the friction disk comes on only after the wheel commences to turn and increases progressively until full speed is obtained. Thus the driving power of the clutch is independent of the operator or of his manipulation of the reversing lever. This feature, it is believed, will be appreciated by owners of boats wherein a sudden reversing or striking of the clutch produces an unpleasant, jerky motion.

It is also to be noted that the friction clutch mechanism as a whole is extremely small and compact in comparison with the power which it transmits. It is stated that the clutches used with various sizes of these engines have in all cases a driving capacity fully twice the rated power of the engines. The value of so generous a power rating for the reversing gear will be appreciated by all familiar with the service required of such mechanism and the abuses which it must often endure.

#### LIMITATIONS OF THE SUBMARINE.

Capt. Bacon, a leading authority on submarine craft, in command of the British submarine fleet from its inception, referring to the fact that the form suitable for high speed on the surface is inimical to fast steaming when submerged, says that the promises made by inventors and dreamers of future possibilities are impossible of realization. It is, therefore, important to make a compromise, as great speed on the surface involves size, and this militates against rapid submergence, and also increases the vulnerability, not only because of the greater target but also of the tardy disappearance. Thus to face torpedo boat destroyers on the surface might be carried, but the difficulty is to know how they could be destroyed when submerged. Moreover, speed under water involves great weight for accumulators, which must be costly in upkeep, because they could not last more than five years. Capt. Bacon says that all difficulties of stability and regulation of submergence have been overcome, and as regards safety suggested says that the idea of fitting bulkheads has been rejected because of the psychological characteristics of sailors, who in the hour of danger would not care to be isolated from their fellows in very confined spaces. Moreover, the smallest accidents when the vessel is under the surface might mean the rush of water at the rate of four tons in 10 seconds. Automatic gear for causing the boat to rise at once to the surface is not to be encouraged. He prefers to depend on the brains of the men, and that has proved effective in the emergencies that have so far arisen. Sir William White deprecates high speed when submerged, as a slight inaccuracy in the angle of the boat would take her to dangerous depths in a comparatively short period of time—a matter of which he has had experience, as years ago he was down in a submarine boat and was raised with extreme difficulty.

#### TRADE NOTES.

The dredge which Louis C. Tiffany, vice president of Tiffany & Co., is building at Cold Spring Harbor, N. Y., will be equipped throughout with H. W. Johns-Manville Co.'s Noark pipe and flange with their 85 per cent magnesia pipe covering.

The Baltimore Gas Machinery Co., 14 West Lexington street Baltimore, Md., has issued a catalogue devoted to section gas producers. The catalogue gives a very exhaustive description of the producer, together with costs in comparison with other fuels. It will be sent to any one for the asking.

The Durable Wire Rope Co., Boston, Mass., have installed in Machinery building, Block 34, at the St. Louis Exposition, a full line of samples of their wire rope. They have also a rope drive in operation. The company states that they will be glad to meet there any one interested and furnish complete information regarding the various uses to which their wire rope may be applied.

The National Electric Co. of Milwaukee has just issued a catalogue devoted to stationary and portable motor-driven air compressors for continuous and intermittent service. The bulletin, which is No. 350, is very beautifully illustrated and gives a thorough description of these compressors, together with their dimensions and capacities. It will be sent to any one upon request.

The Thomas H. Dallet Co., Philadelphia, have just issued a catalogue describing their portable drilling machinery. The Dallet Co. was established in 1883 and has been continually engaged in the building of portable machinery since that time. The usefulness of their machines has been tested in thousands of ships. The catalogue goes very completely into the drills made by this company and may be had upon request.

An elaborate catalogue of over 300 pages, has recently been issued by the Star Brass Mfg. Co., Boston, Mass. This annual catalogue, considerably enlarged because of addition of new devices, illustrates and describes the steam engineering specialties of this company, among which may be mentioned its lines of vacuum, pressure and water gages, "pop" safety, globe, angle and relief valves, revolution counters, lubricators whistles, clocks, etc. That the goods of this company are in the front rank, is attested by their wide use on battleships, cruisers, and torpedo boats built by the United States government, as well as on transatlantic, lake and coasting steamers.

The De Beers Mines Co., Ltd., Kimberly, South Africa, has cabled an order for a third Westinghouse-Parsons steam turbine generating outfit of 1,500 kw. capacity for their power plant at Kimberly. The new turbine unit will be similar in every respect to the two which have been in operation for somewhat over a year. That a concern with the standing of the De Beers company should install machinery built at such a distance speaks well for the confidence which they place in it. The new turbine unit will operate at 150 lbs. boiler pressure, 35° superheat and about 23 in. vacuum. Taking into account the altitude of Kimberly, this would be equivalent to about 27 in. vacuum at sea level. The new unit will be shipped via New York in about six months.

The powerful new dredge Hercules, owned by Michael Sullivan of Detroit was completed July 13, and in tow of one of Hackett's tugs was towed to the lower Detroit river near Amherstburg, where it will immediately start on a part of the government contract for deepening and widening the Amherstburg reach and Hackett range channels. The Hercules is equipped with a six-yard hard rock dipper dredge and is designed to perform the heaviest kind of work. The dredge is 110 ft. long, 40 ft. beam and 12 ft. deep, and has the most modern machinery and equipment available. All engines, hoisting and anchor machinery are independent. The plant includes an electric light engine.

The new four-masted schooner Wm. J. Quillan was launched from the New England Co.'s yard, Bath, Me., July 12.

The new five-masted schooner Margaret Haskell will be launched at Camden, Me., July 16.



## BRITISH ADMIRALTY CHARTS.

Following is the latest list of new and corrected British admiralty charts handled by J. D. Potter, 145 Minories, London:

## No.

- 3420 England, south coast: Yealm river.  
 3418 England, south coast: St. Germans or Lynher river.  
 3367 Channel islands: Island of Jersey.  
 2339 North sea, general chart.  
 3410 France, south coast: Gulf of Foz.  
 3428 Grecian archipelago. Lemnos island: Port Kondia.  
 3404 North American lakes. Lake Superior: Coppermine point to cape Gargantua.  
 3408 West Indies: Puerto Rico.  
 3421 Scotland, west coast: Broadford bay.  
 3387 North America, west coast. Vancouver island and British Columbia: Johnstone strait. Sheet III. (west) (Plan: Forward bay).  
 1789 China sea: Channels, between Sumatra, Linga and Singkep.  
 3371 Philippine islands: Libukan islands to Naro bay.  
 1394 China sea. Gulf of Siam: Entrance to Kuantan river. Entrance to Pahang river. Entrance to Rumpin river, Joara bay.  
 3385 China, east coast. Hongkong: Aberdeen harbor.  
 3365 Korea, southwest coast: Port Hamilton to Mackau group.  
 3366 Korea, southwest coast: Fusan harbor to Port Hamilton.  
 3397 Japan. Nipon, northwest coast: Hamada ko and approaches.  
 3412 Tasmania, north coast: Hunter passage.  
 3419 Australia. Torres strait: Goode island anchorage.  
 3403 Solomon islands: Ysabel island (eastern part).  
 3402 Solomon islands: Ysabel island (western part).  
 3335 Approach to strait of Belle isle. Plan added: Outer sounding off Belle isle.  
 3008 Anchorages in southeast Alaska. Plan added: Killisnoo harbor.  
 1006 Gulf of Aden. Ras Galweni to Ras Hafun. Plan added: Anchorage of Bander Laskhor.  
 3047 Red sea. Harbors and anchorages. Plan added: Khor el Wahla.  
 930 Sulu sea. Anchorages between Borneo and New Guinea. Plan added: Ingelas bay.  
 2772 Sulu sea. Anchorages in Gillolo. Plans added: Ternate road and channel. Jailollo road.  
 2196 Celebes. Sketch plans of anchorages in the southern part of Celebes. New plan: Kali Susu anchorage. Plan added: Kabaena island, south point anchorage.  
 3395 Japan. Plans on the west coast of Nipon. Plan added: Funakawa wan.  
 500 New Hebrides. Anchorages in Malekula island. Plan added: Lambumbu harbor.  
 329 Solomon islands. Bougainville strait. Plan added: Shortland harbor.  
 1141 Islands in the north Pacific. New plan: Laysan island.

## CORRECTIONS AND ADDITIONS.

## No

- 2476 Scotland, west coast: Frith of Lorn.  
 1974 Norway: Jælen to Christiania.  
 2312 Norway. Sheet X. Lofoten islands to Andö.  
 2317 Norway. Sheet XV: Tana fiord to Varanger fiord.  
 2313 Norway. Sheet XI: Andö to Helgö.  
 2207 Gulf of Bothnia. Sheet II.  
 173 Baltic sea: Approaches to Helsingfors and Sveaborg.  
 2247 Gulf of Finland: Hogland to Seskär.  
 77 Spain, north coast: Bay of Gijon, etc.

- 1614 Falkland islands: Stanley harbor.  
 2733 Iceland: Portland to Sneffells Jökul.  
 2978 Iceland: Sigle fiord to Niardvig.  
 2980 Iceland: Storksnæs to Portland.  
 2489 United States, east coast: Nantucket sound and approaches.  
 2491 United States, east coast: Approaches to New York.  
 3204 United States, east coast: New York bay and harbor.  
 2859 West Indies: Plans on the south coast of San Domingo.  
 2544 South America, east coast: Rio de la Plata.  
 1749 South America, east coast: Mone Videá to Buenos Aires.  
 2887 United States, west coast: San Pablo and Suisun bays.  
 2431 Alaska: Port Simpson to Cross sound.  
 2812 Africa, west coast: Lagos harbor.  
 1003 Africa, east coast: Pungue river. Beira harbor.  
 942A Eastern archipelago, eastern portion.  
 1606 Eastern archipelago: Lombok to Flores.  
 2575 Celebes sea, eastern part.  
 957 Philippine islands: Ports in.  
 2578 Philippine islands: Eastern part of the Sulu or Mindoro sea.  
 2577 Philippine islands: Between St. Bernadino and Mindoro straits.  
 854 China, east coast: Port Swatau.  
 1423 New Zealand: Port Nicholson.  
 782 Pacific Ocean: Northeast Sheet.  
 731 Gilbert islands (Kingsmill group).  
 732 Gilbert islands: Makin or Taritari, Tarawa, etc.  
 157A New Hebrides: Malo to Efate island.  
 936A New Caledonia, northwest part.

The steamer Bermudian was launched from Sir James Laing & Sons yard at Sunderland, England, last week for the Quebec Steamship Co. of New York. The Bermudian is a twin-screw steel steamer of 5,500 tons. She is 425 ft. long, 50 ft. beam and 36 ft. 6 in. deep and is equipped with triple-expansion engines 26, 42 and 71 in. cylinder diameters by stroke of 48 in., supplied with steam from three double-ended and three single-ended boilers of 200 lbs. pressure. She will have accommodations for 240 saloon passengers, thirty-two second class and forty-eight third class. She will have a large coal storage capacity for the carriage of green vegetables from Bermuda and meat from New York. The contract calls for delivery by Nov. 1.

The contract has been signed for the building of the fastest steam schooner on the Pacific coast. She is to be built for Beadle Bros. of San Francisco, and will run between San Francisco, Point Arena and Mendocino. The boilers and engines are being built by the Willamette Steel & Iron Works of Portland, Ore. She will be an oil burner and her engines will be of 500 H. P., which will enable her to make 14 miles an hour. The hull of the steamer will be constructed at a shipyard at Aberdeen, Wash. It will be 130 ft. in length, 32 ft. beam and 10 ft. depth of hold. She will have accommodations for sixty passengers.

The Burt & Mitchell dry dock plant in Jersey City has been bought by Wm. Brown, of Dunellin, N. J.

Sealed proposals will be received at the office of the Light House Engineer, Buffalo, N. Y., until 11 o'clock a. m., August 10, 1904, and then opened, for repairing foundation of Cleveland West Breakwater East End Light Station, Ohio, in accordance with specifications, copies of which, with blank proposals and other information may be had upon application to First Lieutenant P. S. BOND, U. S. A., Engineer. Aug. 4

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., June 25, 1904. Sealed proposals for dredging in Calumet River, Ill., will be received here until 12 noon, July 28, 1904, and then publicly opened. Information on application. O. H. EKNST, Col., Engineers. July 21



VOL. XXX.

CLEVELAND, O., JULY 21, 1904.

No. 3

# Boston Steamship Company

S. S. "Shawmut"    S. S. "Tremont"  
S. S. "Lyra"

## Japan, South China & Manila Steamship Line

operated in connection with the Northern Pacific and  
Great Northern Railway Companies.

Monthly Passenger and Freight Service  
From Tacoma and Seattle, Washington.

New twin-screw American Steamships of 10,000 tons register. Exceptionally large staterooms, all outside.

Owing to the great size of the ships, and the immense cargoes carried, it has never been necessary to use racks on the dining tables.

Rates at any office of

Northern Pacific Railway  
Great Northern Railway  
Chicago, Burlington & Quincy Railway  
Thomas Cook & Sons, Tourists Agents

Alfred Winsor, President  
BOSTON, MASS.

Frank Waterhouse, Agent  
SEATTLE, WASH.



**AZALEA METAL**

Anti-Friction

**Highest Grade Bearing Metal.**

...Used for...

**MARINE and STATIONARY ENGINES,  
MACHINERY and RAILROADS.**

Send for free sample for trial.

**ONCE TRIED, ALWAYS USED.****VICTOR METALS CO.,**

East Braintree, Mass. New York Office, 29 Broadway.

**Fogg's Resilient Felt Mattresses and Cushions.**

Manufactured by

**M. W. FOGG,**

202 Front St., N. Y.

Send for Illustrated  
Catalogue.**Detroit White Lead Works**

DETROIT VARNISH COMPANY,

Manufacturers of

**Paints, Varnishes and Specialties**  
specially prepared for marine use.

DETROIT. - CHICAGO. - BUFFALO.

CLEVELAND BRANCH:

**W. H. DONALDSON & CO.,**

127 West River Street.



Improved Belt Helmet

Established 1844.

**A. SCHRADER'S SON.**

32 Rose Street, NEW YORK.

Manufacturer of

**Submarine Armor and Diving Apparatus.**We carry a complete stock of Dresses, Hose  
and Repair Sundries.

All orders filled day received. Write for our prices.

**THE BROWN HOISTING MACHINERY COMPANY. INCORPORATED.**Engineers, Designers, and Manufacturers of Special Machinery for hoisting, conveying, storing and handling material of all kinds under the well known  
"BROWNHOIST" Patents.**BRIDGE UNLOADERS**for rapidly discharging bulk cargoes from  
vessels directly to cars to storage on docks.**Fast Plant Unloaders**for rapidly handling either bulk or package  
freight**CRANES**

of every description for every kind of service.

MAIN OFFICE AND WORKS, CLEVELAND, OHIO, U. S. A.

Eastern Office, 26 Cortlandt St., New York City.

Pittsburg Office, Carnegie Building, Pittsburg, Pa.

European Office, 39 Victoria St. London, S. W.

Established 1857.

**AMERICAN SHIP WINDLASS CO.**  
PROVIDENCE, R. I.We have completed our new IRON FOUNDRY, and are prepared to execute orders for Castings, guaranteeing first-class  
work, prompt service and reasonable prices.**SHIP MACHINERY**EMBODYING THE LATEST DESIGNS AND MANY  
IMPORTANT PATENTED IMPROVEMENTS.

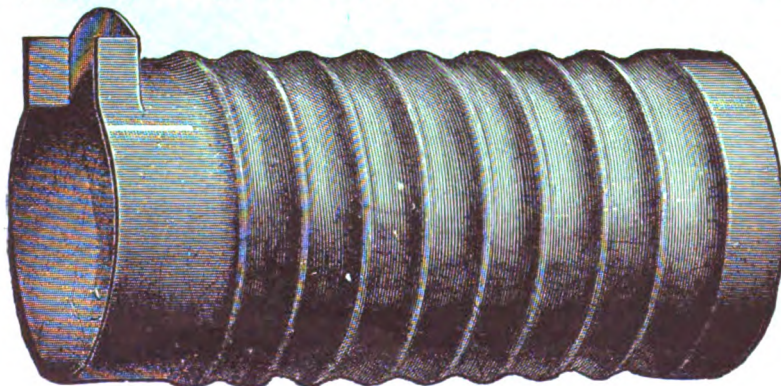
SOLE BUILDERS OF THE

**Original and Only Automatic Steam Towing Machine.**

SEND FOR ILLUSTRATED CATALOGUE.

P. O. BOX 53.

Address: FRANK S. MANTON, President.

**MORISON SUSPENSION BOILER FURNACES****FOR LAND AND MARINE BOILERS.**UNIFORM THICKNESS—EASILY CLEANED  
UNEXCELLED FOR STRENGTH.**Also Fox Corrugated Furnaces.**

MANUFACTURED BY

**THE CONTINENTAL IRON WORKS,**

West and Calyer Sts., NEW YORK.

Near 10th and 23d Sts. Ferries.

Borough of Brooklyn.





## PENBERTHY AUTO-POSITIVE INJECTORS

Light the Way out of Injector  
Troubles.

Steer clear of the rocks that have caused other engineers trouble, and place your reliance on Penberthy Injectors.

Eighteen years on the market and over 350,000 in actual use places them in their present high place—**The Standard Injector of the World.**

*Write for catalogue describing our injectors and other engineers' necessities. The Penberthy Bulletin sent 3 months free to any engineer.*

**Penberthy Injector Co.,** Largest Manufacturers of Injectors in the World, **351 Holden Ave., Detroit, Mich.**

# The United States Shipbuilding Company

43 Cedar Street, New York

## Builders of all Types of Vessels

The only Company in the world that can

**BUILD, EQUIP,  
ARM AND ARMOR** **A Modern Battleship**

without calling upon outside assistance

**CAN MAKE AGREEMENTS COVERING REPAIRS OR BUILDING ON**

**Atlantic and Pacific Oceans**

## ALLEN PORTABLE PNEUMATIC RIVETING MACHINES.

The following concerns are using our machines

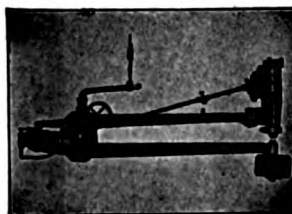


"Cable Address, Riveters" W. U. Code

United States Navy  
Yard, Bremerton,  
Wash.

United States Navy  
Yard, Portsmouth,  
N. H.

United States Navy  
Yard, Mare Island,  
San Francisco, Cal.



Brown Hoisting Machinery Co.,  
Cleveland, O.

New York Ship  
Building Co.  
Camden, N. J.

Wm. R. Trigg Co.,  
Richmond, Va.

Canadian Ship  
Building Co.  
Bridgeburg,  
Ont.



ESTABLISHED 1872.

**JOHN F. ALLEN,**

**370-372 Gerard Avenue, NEW YORK.**

## Steel Castings

from 100 to 75,000 lbs.

## Otis Steel

"Otis" Fire Box Plates a Specialty.

Ship Plates  
Flange Plates  
Tank Plates  
Steel Car Axles  
Forgings of all kinds

**OTIS STEEL CO., Ltd.,**  
**Head Office and Works, CLEVELAND, O.**

New York: Thorpe, Platt & Co., 97 Cedar St.

Montreal: Homer Taylor, 183 St. James St.

AGENCIES.

St. Louis: C. A. Thompson, 516 N. Third St.

San Francisco: John Woodlock, 154-156 First St.





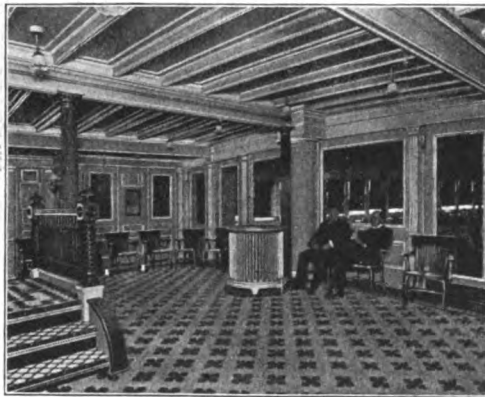
**U. S.**  
**Automatic Injector**

**THE  
U.S. INJECTORS  
ARE BEST.**

Adopted by the United States Government and 200,000 engineers. Buy of the dealer. Do not accept a substitute. Our "Engineer's Red Book" should be in every engineer's pocket. Answers 500 questions of vital importance. Write for it to-day. It's free . . . . .

**American Injector Co.,**  
Detroit, Mich., U. S. A.

## INTERLOCKING RUBBER TILING.



As laid by us on the Quarter Deck, Dining-room, Stairway, etc., of the Steamer "City of Troy."

Is noiseless, non-slippery, waterproof and thoroughly sanitary, more durable than stone or earthen tiles, elegant in appearance, manufactured in a carefully selected variety of colors. Endorsed by the best architects and engineers. A perfect floor for business offices, banking-rooms, court-rooms, vestibules, halls, billiard-rooms, smoking-rooms, cafes, libraries, churches, hospitals, hotels, etc. It is especially and peculiarly adapted for Steamships, Yachts, etc. It stands the constant straining and racking without cracking or separating, and its non-slippery feature is of high value. Samples, estimates and special designs furnished upon application.

BEWARE OF INFRINGERS. PATENTED.

MANUFACTURED SOLELY BY

**NEW YORK BELTING & PACKING CO., Ltd.**

91-93 CHAMBERS ST. NEW YORK  
PHILADELPHIA, 724 Chestnut St.  
BALTIMORE, 41 South Liberty St.  
CHICAGO, 150 Lake St.  
BOSTON, 232 Summer St.  
INDIANAPOLIS, 229 So. Meridian St.  
ST. LOUIS, 411 No. Third Street.  
SAN FRANCISCO, 509-511 Market St.

ARTHUR L. GIBSON & Co., 19-21 Tower Street, Upper St. Martin's Lane, LONDON, ENGLAND.

## HIGH GRADE ENGINES.

VERTICAL  
AND  
HORIZONTAL  
AUTOMATIC  
ENCLOSED  
TYPE.

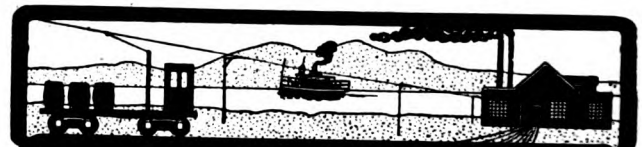


FOR DIRECT-CONNECTED AND BELTED SERVICE  
PERFECT REGULATION AND HIGHEST ECONOMY  
IN STEAM GUARANTEED. ALSO HEATING, VENTILATING AND DRYING APPARATUS, MECHANICAL DRAFT, STEAM AND ELECTRIC FANS, EXHAUSTERS AND BLOWERS.

Manufactured by  
**WM. BAYLEY & SONS CO.**  
MILWAUKEE, WIS., U.S.A.

SALES AGENTS:

OHIO BLOWER CO., CLEVELAND, O.  
THE GLOBE ENGINEERING CO., SAN FRANCISCO, CAL.  
ZIMMERMANN-WELLS-BROWN CO., PORTLAND, OREGON.



## Technical Office of Le Mois Scientifique et Industriel.

8 Rue Nouvelle, Paris (9e).

We have with our collaborators opened an office to supply answers on all scientific, mining, technical and bibliographical studies or practical questions. We help *industrials* who have opened new enterprises, *professors* who must resolve unfamiliar problems, *lecturers*, *teachers*, *students*, etc. We furnish a complete course, detailed bibliographical work, complete study, cost prices, plans, drawings, illustrations, projections, etc.

ASK FOR SPECIAL NOTICE.

Add 4 cents for postage.  
Short Delays for Answers. The Terms are very moderate.

7,000,000 CARD'S INDEX.

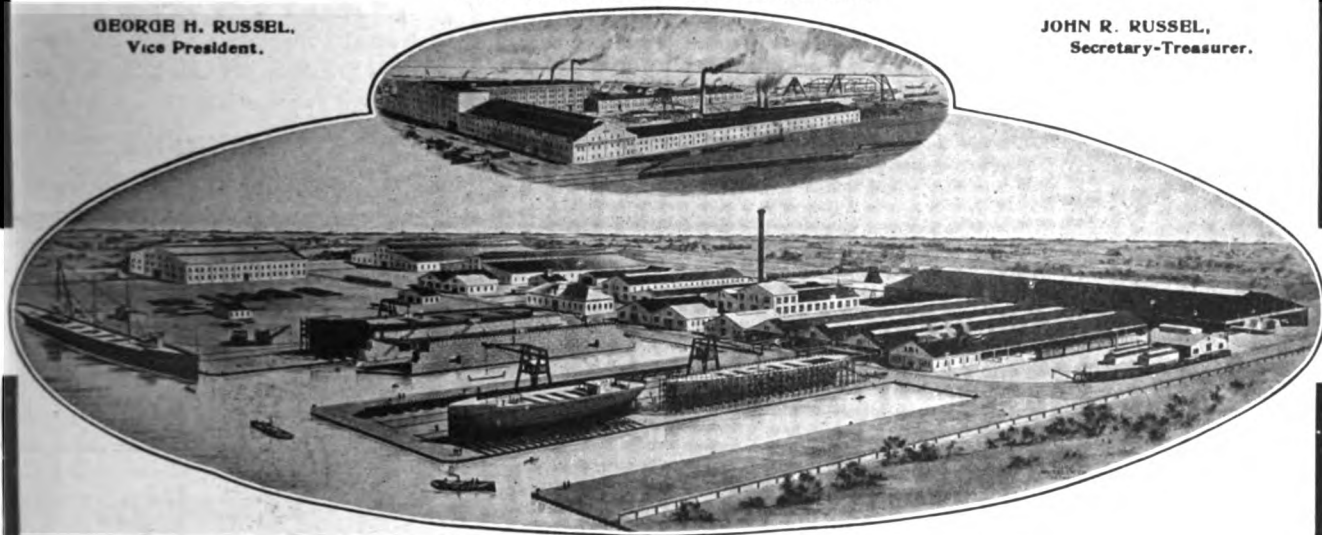
# GREAT LAKES ENGINEERING WORKS

## DETROIT, MICH.

ANTONIO C. PESSANO, Pres. and Gen. Mgr.

GEORGE H. RUSSEL,  
Vice President.

JOHN R. RUSSEL,  
Secretary-Treasurer.



Designers and Builders of  
Steel Freight and Passenger Ships.

**Our Plant is the Largest,  
Best Equipped and Most Complete  
on the Great Lakes.**

Marine Repairs a Specialty.





## SIPE'S JAPAN OIL

Superior to linseed oil for all kinds of painting.

Cheaper and more durable. Does not require the addition of Dryers.  
Not affected by sulphur or salt water

### OUR BLACK PAINTS

Universally used. Best on the market.

For PAINTING STACKS, CYLINDERS, HULLS, ETC.

Prices and Samples furnished on application.

**JAS. B. SIPE & CO.** Sole Manufacturers,  
ALLEGHENY, PA., U. S. A.

We may sail all the seas of paint literature, touching at every port, but we will find a safe anchorage nowhere but in

## OXIDE OF ZINC

the only white pigment that will withstand the conditions of marine service.

FREE: Our Practical Pamphlets:

- "The Paint Question"
- "Paints in Architecture"
- "Specifications for Architects"
- "French Government Decrees"

**The New Jersey Zinc Co.,**

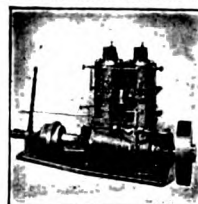
**71 Broadway,  
NEW YORK.**

We do not grind zinc in oil. List of zinc paint manufacturers furnished on request.

## THE MIETZ & WEISS MARINE OIL ENGINE.

SIZES FROM 1 TO 60 H. P.

Adopted by the United States and Foreign Governments.



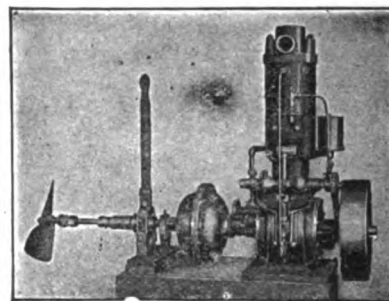
Runs with common kerosene, distillate or fuel oils. No dangerous gasoline used.

**MOST ECONOMICAL AND SAFEST POWER KNOWN.**

### Stationary and Marine Engines

For Pumping, Electric Lighting, Charging Storage Batteries and All Power Purposes.

**Hoists, Pumps, Air Compressors, Portable Engines, Dynamos.**



Highest Award for direct coupled engine and dynamo, Paris Exposition, 1900.  
Gold Medal, Pan-American Exposition, 1901.  
Gold Medal, Charleston, S. C., Exposition, 1902.

Send for Catalogue Dept. 102.

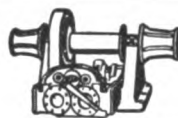
**AUG. MIETZ,**  
128-138 Mott St.,  
NEW YORK.



### GASOLINE MARINE ENGINES

Suitable for all Boats from 3½ to 200 HP. Over 100 in successful use.

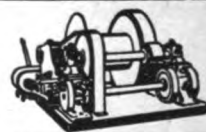
Also the well known and always reliable Woolters Gas or Gasoline Stationary Engines.



### HOISTING ENGINES

Of all kinds and sizes, and for all purposes, especially for ship use.

Docking and Hauling Engines and Wire Rope Windlasses.



### AUTOMATIC TOWING MACHINES

Somewhat the cheapest, and altogether the best. Positively guaranteed.

Automatic Fog Whistle Machines Steam Steering Engines.

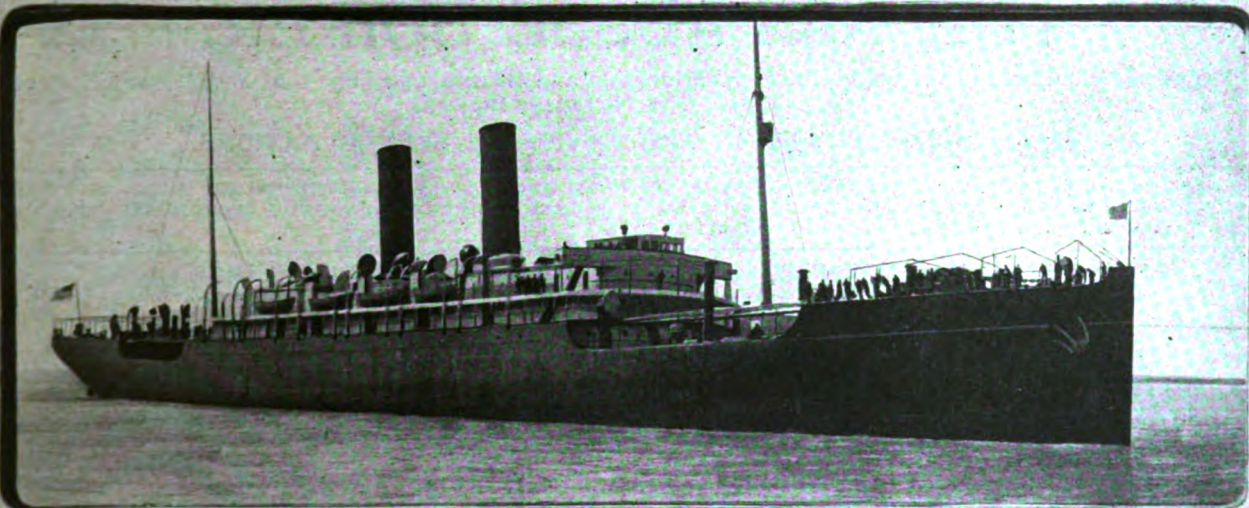
FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO.

**THE CHASE MACHINE CO. Engineers and Machinists, CLEVELAND, OHIO.**



# OUR SHIPYARD

WITH ITS ACCOMPANYING DRY DOCKS  
AND WORKS, WAS CAREFULLY DESIGNED,  
EQUIPPED AND COMPLETED FOR THE



CONSTRUCTION AND REPAIRING  
IN EVERY DETAIL OF

BATTLE SHIPS · ARMORED CRUISERS ·  
PROTECTED CRUISERS · GUN BOATS ·  
TORPEDO BOATS · TORPEDO BOAT  
DESTROYERS · SUBMARINE BOATS ·  
OCEAN LINERS · PASSENGER STEAM  
ERS · FREIGHT CARRIERS · ETC · ETC ·

NEWPORT NEWS SHIPBUILDING & DRY DOCK CO.  
1 BROADWAY NEW YORK — NEWPORT NEWS, VA.



## BABCOCK & WILCOX

### Forged Steel Water Tube Marine Boilers

In use on the *Augustus B. Wolvin*, largest steamer on the Great Lakes.

New Battleship *Rhode Island*, 19,000 Indicated Horse Power, and new Cruiser *California*, 23,000 Indicated Horse Power will have these boilers. Boilers ordered for the largest Battleship of the Italian navy, *Napoli*, 19,000 Indicated Horse Power.

**Straight Tubes**

PRINCIPLES OF CONSTRUCTION HAVE  
STOOD THE TEST OF TIME

**Expanded Joints**

Offices in the Largest Cities of the World.

Works: Bayonne, N. J.

Paris, France.

Renfrew, Scotland.

Oberhausen, Germany.

## THE NICLAUSSE BOILER.

The largest merchantmen in the world, the *S. S. Minnesota* and *Dakota*, of 33,000 tons and 11,000 H. P. each, are equipped with **Niclausse Boilers**.

**641,000 HORSE POWER IN THE NAVIES OF ELEVEN NATIONS.**

THE NEW JAPANESE CRUISERS, *KATORI* AND *KASHIMA*, OF 16,000 H. P. EACH, AND IN THE UNITED STATES NAVY THE ARMORED CRUISERS *PENNSYLVANIA* AND *COLORADO*, 23,000 H. P. EACH, AND THE BATTLESHIPS *GEORGIA* AND *VIRGINIA*, 19,000 H. P. EACH, WILL BE FITTED WITH THESE BOILERS.

**THE ONLY WATER-TUBE BOILER SUCCESSFULLY USED AND PROVED IN LARGE SHIPS.**

Requires no space at sides or rear—cleaned from the front.

Employs no tube-caps—tubes can readily be withdrawn without mutilation.

FORGED STEEL THROUGHOUT.

THE STIRLING COMPANY

Chicago.

## PINTSCH GAS LIGHTED BUOYS

*Adopted by the English, German, French, Russian and United States Light House Departments for Channel and Harbor Lighting; over 1700 gas buoys and gas beacons in service. : : : :*

**BURN CONTINUOUSLY** FROM 80 TO 365 DAYS AND NIGHTS WITHOUT ATTENTION, AND CAN BE SEEN AT A DISTANCE OF SIX MILES. : : : :

**Brilliant and Steady Illumination.**

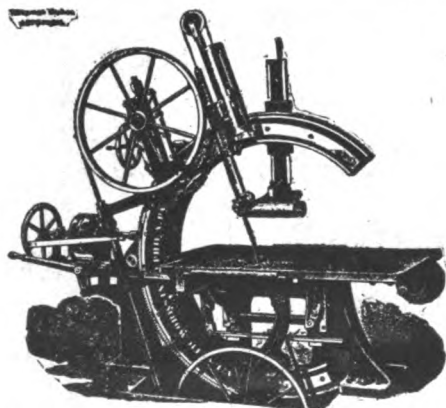
**Economical and Reliable in Operation**

Controlled by the

**SAFETY CAR HEATING AND LIGHTING COMPANY,**

160 BROADWAY,

NEW YORK CITY.



ADJUSTABLE BEVEL BAND SAW.—Will bevel both ways at 45 degrees. Power Movement to change angles. Power feed in three directions.

ESTABLISHED 1869.

INCORPORATED 1896.

## ATLANTIC WORKS INCORPORATED,

Successors to *Berry & Orton Company*.

2870-72-74-76-78 Gray's Ferry Road, PHILADELPHIA, PA.

MANUFACTURERS OF

**MACHINERY FOR WORKING WOOD**

FOR USE IN

**Ship Yards, Car Shops, Railroad Shops.**

SEND FOR CATALOGUE.

ESTIMATES FURNISHED.

**Hollow Chisel Mortisers.**

**Car Sill Dressers.**

# "DEARBORN" VEGETABLE FEED-WATER TREATMENT.

SPECIAL MARINE FORMULA NO. 5.

PREPARED BY EXPERT CHEMISTS TO EXACTLY SUIT THE WATERS OF THE LAKES.

Agents at Lake Ports.

When in Chicago Visit our Laboratories.

## DEARBORN DRUG & CHEMICAL WORKS

G. R. CARR, Mgr.  
MARINE DEP'T.

15 Branch Offices in U. S.

27-34 Rialto Bldg., CHICAGO.

## THE STANLEY B. SMITH COAL AND DOCK CO., TOLEDO HARBOR, TOLEDO, OHIO.

1,800 Feet of Dock.

6 McMyler Derricks.

Capacity 3,000 Tons Daily.

Fuel Lighters. —"KANAWHA."  
—"PENNSYLVANIA."  
—"HOCKING."Docks. —PENNSYLVANIA R. R.  
—HOCKING VALLEY R. R.  
—TOLEDO AND OHIO CEN. RAL R. R.

## SMITH'S COAL DOCK, Detroit River, DETROIT, MICH.

12 Pockets.

Platform.

Low Dock.

Operated by STANLEY B. SMITH &amp; CO.

MARINE SUPPLY COMPANY—STORE AND ICE HOUSE ON DOCK.

# PITTSBURG COAL COMPANY.

Steamboat Fueling Facilities at Various Points on the Great Lakes:

CLEVELAND HARBOR { 4 Car Dumpers.  
3 Lighters.FAIRPORT HARBOR { 1 Car Dumper.  
1 Lighter.ASHTABULA HARBOR { 1 Car Dumper.  
1 Lighter.ERIE HARBOR { 1 Car Dumper.  
Fuel Pockets.DETROIT RIVER BRANCH { Docks and Pockets at  
Sandwich and Amherstburg.SAULT RIVER BRANCHES { Dock and Pockets at Detour.  
Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)WE FURNISH ONLY  
THE BEST GRADE OF

## Pittsburg and Youghioghenny Coal.

GENERAL OFFICE, LAKE DEPARTMENT, PERRY-PAYNE BUILDING, CLEVELAND, OHIO.

## TEN SMITH CONCRETE MIXERS IN ONE ORDER.

MADE IN SEVEN  
SIZES. ANY COM-  
BINATION AS TO  
MOUNTING AND  
POWER.COLONIAL SUPPLY CO.,  
Boston, Mass.  
JOHN L. KIRK,  
Pittsburg, Pa.ENDORSED BY  
BEST ENGINEERS  
AND CONTRACT-  
ORS. SAVES ITS  
COST IN THIRTY  
DAYS.THE WM. PATTISON SUPPLY  
CO. Cleveland, Ohio.  
HENSHAW BULKLEY CO.,  
San Francisco and Seattle.

Nearly 600 in use, all giving perfect satisfaction. Send for Catalogs and Booklet "CONCRETE CATECHISM."

509 W. Fifth St.,  
KANSAS CITY, MO.

CONTRACTORS' SUPPLY &amp; EQUIPMENT CO.,

232 Fifth Ave.,  
CHICAGO.



WM. L. BROWN, President.

J. C. WALLACE, Vice-Pres.

O. R. SINCLAIR, Sec'y and Treas.

ALFRED G. SMITH, Gen'l Supt.

# CHICAGO SHIP BUILDING COMPANY,

Steel Ship Builders and  
Dry Dock Proprietors.

Dry Dock and Yards: 101st St. and Calumet River, - - - CHICAGO, ILL.

# MILWAUKEE DRY DOCK COMPANY,

MILWAUKEE, WISCONSIN.

Ship Repairs of all kinds.

Two Ship Yards offer every Facility for the Repair of both Steel and Wooden Vessels.

*South Yard Dock is 450 ft. long on keel blocks; 460 feet over all; 60 feet width of gate, and 16 feet over sill.*

*West Yard Dock 312 feet on keel blocks; 45 feet width of gate, and 12 feet over sill.*

RUDDER PIT IN EACH DOCK.

ELECTRIC LIGHTS FOR NIGHT WORK.

Main Office at SOUTH YARD, Foot of Washington Street.

EDWARD SMITH, President.

WILLIAM KNIGHT, Ass't Sec'y and Treas.

O. T. WARREN, Superintendent

# THE BUFFALO DRY DOCK COMPANY,

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-Ton Shear Legs, and in every way Equipped with Modern Plant for the  
Building and Economical Repairs of

STEEL AND WOODEN SHIPS.

LONG DISTANCE TELEPHONE CONNECTIONS:

Office Telephone, 515 Seneca.  
President's Telephone, 209 Bryant, Residence.

President's Telephone, 3920 Seneca, Office.  
Asst. Sec'y & Treas., Telephone, 609 Bryant, Residence.

# THE SUPERIOR SHIP BUILDING COMPANY,

Ship and Engine Builders.  
Dry Dock and Repairs of all kinds.  
Two Largest Dry Docks on the Lakes.

Large Stock of Material Always on Hand for Repairing Wooden and Metal Ships.

Repairing Promptly Attended to, Night or Day.

West Superior, Wis.

W. L. BROWN,  
President.

JAS. C. WALLACE,  
Vice-President and General Manager.

R. C. WETMORE,  
Secretary and Treasurer.

**DRY DOCKS IN CLEVELAND:**

No. 1, foot Weddell St., 547 ft. x 65 ft. x 15 ft. 6 in.  
No. 2, foot Weddell St., 450 ft. x 50 ft. x 16 ft.

No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.  
Dry Dock at Lorain, 560 ft. x 60 ft. x 17 ft.

# THE AMERICAN SHIP BUILDING COMPANY,

Office, 120 Viaduct, Cleveland, O.

Marine and  
Stationary Engines

## STEEL SHIPS

Boilers and  
Auxiliary Machinery

Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System, as applied to boilers, giving increased power and great economy.

Prompt Attention Given to Ship Repairs of All Kinds

WORKS AT CLEVELAND AND LORAIN

ALEXANDER McVITTIE, President and Manager. WILLIAM C. McMILLAN, Vice President.  
CHARLES B. CALDER, General Superintendent.

M. E. FARR, Secretary and Treasurer.  
FRANK E. KIRBY, Consulting Engineer.

# DETROIT SHIPBUILDING COMPANY,

Ship and Engine Builders, Detroit, Mich.

Sole Owners for the Lakes and Atlantic Coast of the HOWDEN HOT DRAFT SYSTEM as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Michigan.

Wooden Ship Yards and Dry Docks, Foot of Orleans Street, and Foot of Clark Avenue, Detroit, Mich.

# The Jenks Ship Building Co.

## STEEL SHIP BUILDERS,

## MARINE ENGINES AND BOILERS.

Prompt Attention Given to Repairs of all Kinds on Ships, Engines and Boilers.

OFFICE AND MACHINE SHOPS  
AT FOURTH STREET.

YARDS AT FOOT OF LINCOLN  
AVENUE.

PORT HURON.

-

-

MICHIGAN.

## TO ENGAGE SERVICES

Lighter T. F. NEWMAN, Wrecking Steamer  
FAVORITE, Wrecking Steamer SAGINAW,  
or any Tug or Wrecking Service between Lake  
Huron or Lake Erie, call

PARKER BROS. CO., Ltd., DETROIT, or any office THE GREAT LAKES TOWING CO.



# Books on Naval Architecture, Ship Yard Practice, Seamanship, Etc.

AMERICAN PRACTICAL NAVIGATOR—Nathaniel Bowditch. 1903 edition .....	\$2 25	POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery .....	\$3 00
DATA BOOK—Naval architects and engineers' data book. By T. H. Watson. A reliable and simple means of recording valuable data, etc., of vessels and engines. Size of book, 8¼ in. by 5 in., cloth .....	1 50	PRACTICAL COMPASS ADJUSTMENT on Iron, Composite and Wooden Vessels. Illustrated.—Capt. W. J. Smith .....	2 00
ELECTROMAGNETIC PHENOMENA AND THE DEVIATIONS OF THE COMPASS—Com. T. A. Lyons .....	6 00	PRACTICAL INFORMATION ON THE DEVIATION OF THE COMPASS, for the use of Masters and Mates of Iron Ships—J. T. Towson .....	2 00
ELEMENTARY SEAMANSHIP—By Barker. New and enlarged edition .....	2 50	PRACTICAL SEAMANSHIP FOR USE IN THE MERCHANT SERVICE: Including all ordinary subjects; also Steam Seamanship. Wreck Lifting, Avoiding Collision, Wire Splicing, Displacement and everything necessary to be known by seamen of the present day. Second edition, illustrated.—John Todd and W. B. Whall .....	8 40
ELEMENTS OF NAVIGATION—Henderson .....	1 00	PRACTICAL SHIPBUILDING: A treatise on the structural design and building of modern steel vessels—By A. Campbell Holms—Two volumes.....	16 00
HAND BOOK OF ADMIRALTY LAW—Robt. M. Hughes....	3 75	RESISTANCE AND PROPULSION OF SHIPS—Durand.....	5 00
HINTS ON LEGAL DUTIES OF SHIPMASTERS—B. W. Ginsburg .....	1 75	SELF-INSTRUCTOR IN NAVIGATION AND PRACTICAL GUIDE to the examinations of the U. S. Government Inspectors for masters and mates of ocean-going steamships and sailing vessels—Capt. W. J. Smith. Second edition, revised and enlarged. Cloth bound .....	2 00
HOW TO BUILD A LAUNCH FROM PLANS—, with general instructions for the care and running of gas engines. Chas. G. Davis .....	1 50	SELF-INSTRUCTION IN THE PRACTICE AND THEORY OF NAVIGATION—Earl of Dunraven. Two volumes.....	7 00
ILLUSTRATED NAUTICAL ENCYCLOPEDIA—Howard Patterson .....	3 00	SHIP BUILDING—Tables for constructing ship's lines. Second edition. Archibald Hogg .....	2 00
INTERNATIONAL SIGNAL CODE—Bureau of Navigation. New edition .....	3 00	SIMPLE ELEMENTS OF NAVIGATION—Young. New second edition .....	2 00
KNOW YOUR OWN SHIP—Thos. Walton .....	2 50	SMALL YACHT CONSTRUCTION AND RIGGING—Linton Hope .....	3 00
MANUAL OF ALGEBRA—R. C. Buck. For the use, more especially, of young sailors and officers in the merchant navy; numerous examples and exercises .....	1 50	STABILITY OF SHIPS—Sir E. J. Reed .....	8 40
MARINE INSURANCE—W. Gow .....	1 50	STEEL SHIPS: Their Construction and Maintenance. A manual for ship builders, ship superintendents, students and marine engineers—Thos. Walton .....	5 50
MARINER'S COMPASS IN AN IRON SHIP: How to keep it efficient and use it intelligently—J. W. Dixon.....	1 00	TEXT BOOK OF NAVAL ARCHITECTURE—J. J. Welch ....	1 50
MODEL ENGINES AND SMALL BOATS—N. M. Hopkins. New methods of engine and boiler making; ship design and construction; fifty illustrations .....	1 25	TEXT BOOK OF SEAMANSHIP—Com. S. B. Luce. U. S. N. Equipping and handling of vessels under sail or steam....	10 00
MODERN SEAMANSHIP—Lieut. Com. Austin M. Knight, U. S. N. Adopted as the text book of the United States Naval Academy .....	6 00	THEORETICAL NAVAL ARCHITECTURE: A treatise on the calculation involved in naval design—Samuel J. P. Thearle. In two volumes .....	3 50
MODERN NAVIGATION: A text book of navigation and nautical astronomy, suitable for the examinations of the royal navy and board of education—Wm. A. Hall.....	4 00	THEORETICAL NAVAL ARCHITECTURE—E. L. Attwood. Text book; 114 diagrams .....	2 50
MODERN PRACTICE OF SHIP BUILDING IN IRON AND STEEL—Samuel J. P. Thearle. Two volumes. Second edition, revised and enlarged .....	5 25	"WRINKLES" IN PRACTICAL NAVIGATION. Ninth edition, revised. S. T. S. Lecky .....	8 40
NAVAL ARCHITECTURE—Cecil H. Peabody. Just published....	7 50	YACHT ETIQUETTE—Capt. Howard Patterson .....	1 00
NAVAL ARCHITECTURE: A manual on laying off iron and steel vessels—Thos. H. Watson. Valuable for naval architects as well as beginners in ship yards.....	5 00		
NAVAL ARCHITECTURE—Sir W. H. White. New edition. 750 pages .....	9 00		
NAVAL ARCHITECTS AND SHIPBUILDERS' POCKET BOOK—Clement Mackrow. Formulae, rules and tables, and marine engineers' and surveyors' Handy Book of Reference. Eighth edition, revised and enlarged .....	5 00		
NAVIGATION SIMPLIFIED—C. E. McArthur. Containing all problems required for U. S. Local Inspector's Examination of Masters and Mates of seagoing vessels .....	1 00		

Sent to any address, carriage prepaid, at prices named. There is no book on Navigation, Marine Engineering, Ship Building, or the allied industries, that is not either published or for sale by the

## MARINE REVIEW,

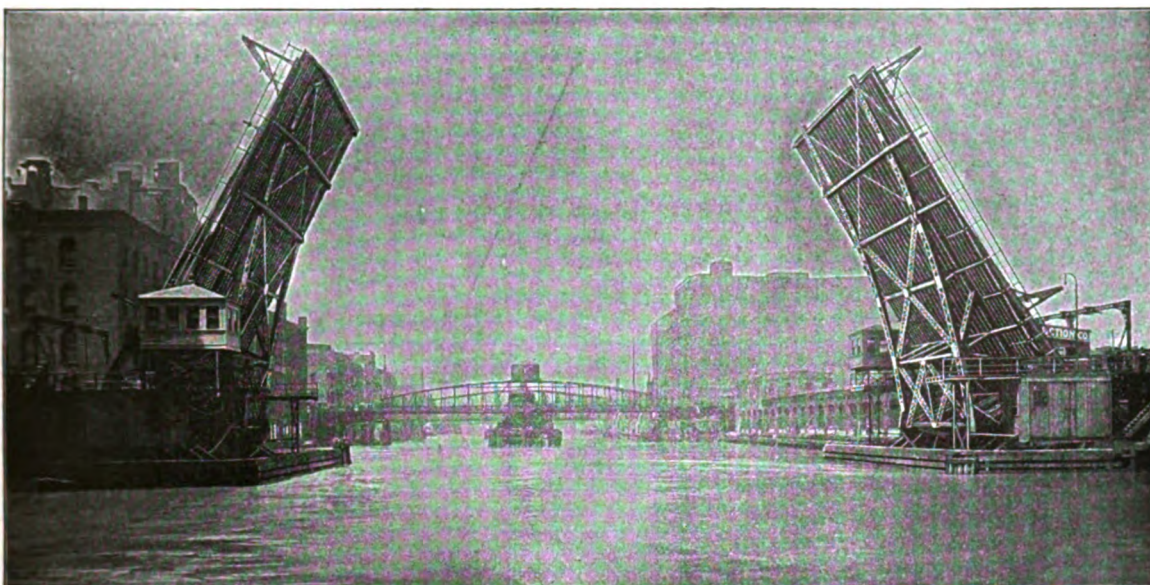
39-41 Wade Bldg., CLEVELAND, O.

**CONTRAST**

The wide and clear channel provided for navigation by this Scherzer Rolling Lift Bridge with the two narrow and inadequate channels allowed by the obstructing center-pier swing bridge further up the river.

**Scherzer Rolling Lift Bridges**

can be opened or closed in less than 90 seconds, and in opening roll back and away from the navigable channel, giving greater freedom for the movement of vessels through the draw than any other type of movable bridge. They can be designed to span any desired width of channel and to meet the most complex local conditions.



## The Scherzer Rolling Lift Bridge Co.,

Main Offices:

1616 Monadnock Block,

-

-

Chicago, U. S. A.

## Books on Yacht and Launch Building and Sailing

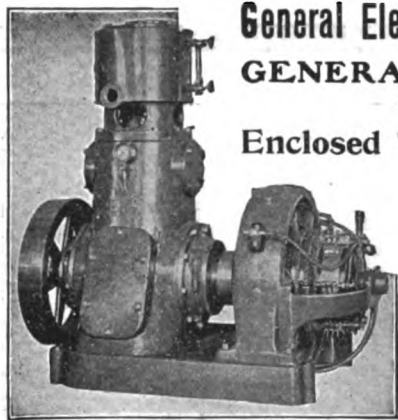
Text Book of Marine Motors. By Captain Du Boulay	-	-	-	\$2.50
Cruises in Small Yachts and Big Canoes. By Speed	-	-	-	2.50
How to Build a Motor Launch	-	-	-	1.00
How to Build a Model Yacht	-	-	-	1.00
How to Build a Speed Launch	-	-	-	1.00
Manual of Yacht and Boat Sailing. By Dixon Kemp	-	-	-	12.00
Navigation for Yachtsman. By V. J. English, R. N.	-	-	-	7.50
Yachts and Yacht Handling. By T. F. Day	-	-	-	1.00
Marine Motors and Marine Launches. By Roberts	-	-	-	1.00
Yacht Etiquette. By Patterson	-	-	-	1.00
Practical Boatbuilding. By Nelson.	-	-	-	1.00
Practical Boat Sailing. By Davies	-	-	-	2.00
Patterson's Illustrated Nautical Encyclopaedia	-	-	-	3.00
Sails and Sail Making	-	-	-	1.25
Small Boat Sailing. By Knight	-	-	-	1.50
Small Yachts. By Kunhardt	-	-	-	10.00
Steam Yachts and Launches. By Kunhardt	-	-	-	3.00
Simple Elements of Navigation. By Young	-	-	-	2.50
The Yachtsman's Kedge Anchor	-	-	-	1.00
Tables for Constructing Ships' Lines. By Hogg	-	-	-	2.00
Yacht Architecture. By Dixon Kemp	-	-	-	16.80

SENT POSTPAID TO ANY ADDRESS

THE PENTON PUBLISHING COMPANY,

CLEVELAND, OHIO.





**General Electric Company's  
GENERATING SETS  
WITH  
Enclosed Type Engines.**

Have automatic forced lubricating, which reduces wear and attention to a minimum and insures quiet operation.

Sizes from 7 KW. to 25 KW.  
Write for Bulletin 4272.  
**General Office,  
Schenectady,  
New York.**

A MARINE GENERATING SET.

**CLEVELAND OFFICE: CITIZENS BUILDING.**  
SALES OFFICES IN ALL LARGE CITIES.



**ASHTON**  
Cam Lever Pop Safety Valves  
and Non-Corrosive steam gauges  
give highest efficiency and durability.  
Specify them and get the best.



**The Ashton Valve Co.,** Boston, New York  
and Chicago, U. S. A.

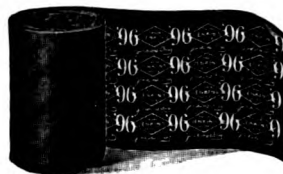
All of the latest and largest LAKE STEAMSHIPS are completely equipped with

**BLAKE**

**DUPLEX AND SIMPLEX SPECIAL MARINE PUMPS.**  
New Marine Catalog ready about July 1st.

**Geo. F. Blake Mfg. Co.**  
114 Liberty St., NEW YORK CITY.

**T**IME and Steam cost money. Leaky steam joints waste them fast. **JENKINS '96 PACKING**---which is absolutely guaranteed---saves both.



*Insist on having  
Packing stamped  
with Trade Mark  
as shown in the  
cut, if you would  
have the genuine*

**JENKINS BROS.,** - NEW YORK, BOSTON, CHICAGO,  
PHILADELPHIA, LONDON.

**THE  
BOURNE-FULLER CO.**  
IRON, STEEL,  
PIG IRON,  
COKE.  
Cleveland, Ohio.

**TUBES**  
*Just Added—a stock of 2, 2½, 3, 3½, 4 and 5 inch  
LAP WELDED STEEL BOILER TUBES  
in 10, 12, 14, 16, 18 and 20 ft. lengths, for immediate  
shipment.*  
**Write for Prices.**

# BELLEVILLE WATER-TUBE BOILERS

**NOW IN USE (MARCH, 1904)**

**On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.**

French Navy	-	-	-	-	-	-	-	-	355,560 H. P.
English Royal Navy	-	-	-	-	-	-	-	-	966,300 "
Russian Imperial Navy	-	-	-	-	-	-	-	-	224,500 "
Japanese Imperial Navy	-	-	-	-	-	-	-	-	122,700 "
Austrian Imperial Navy	-	-	-	-	-	-	-	-	56,700 "
Italian Royal Navy	-	-	-	-	-	-	-	-	13,500 "
Chilian Navy	-	-	-	-	-	-	-	-	26,500 "
Argentine Navy	-	-	-	-	-	-	-	-	13,000 "
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	-	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	-	Steamships
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	-	18,500 "
<b>Total Horse Power of Boilers in Use</b>									<b>1,884,860</b>

**Société Anonyme des Etablissements Delaunay Belleville**

CAPITAL: 6,000,000 FRANCS

Works and Dock Yards of the Ermitage at Saint-Denis (Seine), France.

Telegraphic Address: Belleville, Saint-Denis-Sur-Seine

**WANTED and FOR SALE Department.****FOR SALE.****Steam Launch for Sale.**

Big bargain. Only \$1,950. Full cabin, well built steam launch. Cost \$4,000 to build. Will carry 60 persons. In good condition. If you mean business send for cut and description. Address J. C. Kimball, Jr., 134 Washington St., Chicago. July 21

**Steam Yacht for Sale.**

Steam Yacht "Huntress," built in 1880, now in first-class repair; \$1,000 repairs to hull last fall. Carries 210 passengers. Will make 11 miles an hour all day; economical to run. Cost \$18,000. Write for particulars C. S. Cadwallader, Secretary Smith, Davis & Co., Buffalo, N. Y. Aug. 11

**Steam Barge J.G. Nichols.**

Length 106 ft., beam 22 ft.  
Engine 10 by 20 by 11.  
Boiler 8 ft. 6 in. long, 48 in. dia.  
Steam pressure 137 lbs.  
Engine and boiler in first-class shape.  
Steam hoister and derrick forward.  
Will sell cheap to quick buyer.  
Address Walter V. Metcalf, 93 Eliot St., Cleveland. Aug. 4

**Marine Boiler for Sale.**

Scotch marine boiler 11 ft. diameter, 13 ft. long; two furnaces; allowed 120 lbs. steam. Practically new. Address Box 69, Marine Review, Cleveland. tf

**FOR SALE.****Scow for Sale.**

Large scow Koal Kabin, with one automatic Scotch four-drum deck hoist aft, one American two-drum deck hoist forward; with derricks and attachments for each hoist. One 6-in. ballast steam pump aft; one 9 in. windlass pump forward. New decks and beams. New Scotch boiler furnishes steam sufficient to operate pumps or hoists. Price \$1,300. Come and look her over at Port Huron. R. P. Thompson, Port Huron, Mich. tf

**For Sale—Tug Jim Pullar and Scow.**

Tug—built in 1894; 61 ft. long; 15 ft. beam. Water tube boiler. Compound condensing engine. Strong and seaworthy.

Scow—five years old. Excellent construction; 132 ft. long; 29½ ft wide at center, 26 ft. wide at ends. Platform style, with stake pockets.

Tug and Scow recently overhauled and are in good condition. May be seen at Washburn, Wis., dock.

Address, Fowler-Jacobs Co., Fisher Building, Chicago. Aug. 11

**FOR SALE.****For Sale—A Bargain \$20,000.**

Cost \$25,000 within last year. Original cost \$100,000. A2 Wooden steamer, first class condition; entirely rebuilt; 206 ft. long, 33 ft. beam. Two decks and gangways. Top deck 113 ft clear between cabins. Boilers, engines, etc., in first class condition. Can carry grain, package freight, coal, ties, etc. Package freight and boom hoist. Can be seen at Buffalo or Chicago. Address R. S. Hicks, 44 King St., Toronto, Can. tf

**WANTED.****Capstan Wanted.**

Good second-hand steam capstan wanted. Give price and location. Address Box 68, Marine Review, Cleveland. July 21

**Wanted.**

Tugs and Yachts to build. Will go and build elsewhere if necessary. Thomas Thurston & Son, Alexandria Bay, N. Y. Aug. 18

**Foreman Joiner Wants Position.**

A number of years experience on all kinds of ship and yacht work. Strictly temperate and can give good references. Address, Box 70, Marine Review, Cleveland. July 21.

**Steam Yacht Catherine.**

FOR SALE—Length 78 ft., beam 18 ft., triple expansion engines, water tube boiler, allowed 200 lbs.; electric light, search light, mahogany deck house 9 by 16, power launch, complete outfit, all in first-class condition. One of the best family cruising yachts on the Lakes. Inquire Wickes Bros., Saginaw, Mich. Aug. 4

**STEAMER C.W. LIKEN.**

FOR SALE. Freight and passenger steamer C. W. Liken. Rebuilt in 1904, nearly new. Length 79 ft., beam 18 ft., draught 5 ft., loaded. High speed engine 12 by 12; Tubular boiler, good condition, allowed 80 lbs. steam. For sale, cash, or time approved notes, 7 per cent. interest, \$1,800, a third value. Boat can be seen at Bay City. For further particulars address A. Wheeler, Bay City, Mich. Aug. 4



FOR SALE—Steamer Isaac Lincoln, built 1898, rated A1\*. Carries 350 M ft. of lumber or 500 tons coal on 10½ ft. draught. Equipped with electric lights, steam steering gear, steam hoist, stockless anchors and is a good tower.

Also barge Robinson. Rated A2. Carries 550 M ft. of lumber or 800 tons of coal on 11 ft. draught.

For further particulars address A. F. Price, Fremont, O. July 14

**KIELEY****Standard Steam Trap****Made for Marine Work.**

Also Reducing Valves, Steam Separators and expansion Traps for Marine Purpose.

**SENT ON TRIAL**

Good for any Pressure.

**KIELEY & MUELLER**

7-17 West Thirteenth St., New York

WRITE FOR CATALOGUE.





## THE CLEVELAND & BUFFALO TRANSIT COMPANY.

UNPARALLELED NIGHT SERVICE.

NEW STEAMERS "CITY OF BUFFALO" AND "CITY OF ERIE"

Both together being, without doubt, in all respects the finest and fastest that are run in the interest of the traveling public in the United States.

TIME CARD.—DAILY INCLUDING SUNDAY. CENTRAL STANDARD TIME.

Leave CLEVELAND 8 p. m. Arrive BUFFALO 6:30 a. m.

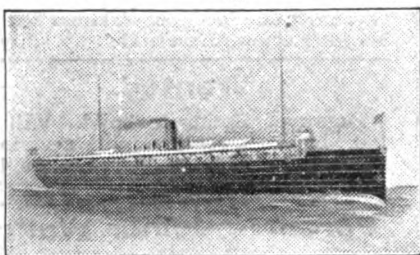
" BUFFALO 8 p. m. " CLEVELAND 6:30 a. m.

ORCHESTRA ACCOMPANIES EACH STEAMER.

Connections made at Buffalo with trains for all Eastern and Canadian points; at Cleveland for Toledo, Detroit and all points West and Southwest. Tickets reading over L. S. & M. S. Ky. will be accepted on this Company's Steamers without extra charge. Special Low Rates Cleveland to Buffalo and Niagara Falls every Saturday Night, also Buffalo to Cleveland. Ask Ticket Agents for tickets via C. & B. Line. Send four cents for illustrated pamphlet.

W. F. HERMAN, G. P. A., Cleveland, O.

## Northern Michigan Transportation Co.



Chicago,  
Ludington,  
Manistee,  
Charlevoix,  
Petoskey,  
Harbor  
Springs,  
Mackinac  
Island.

STEAMSHIPS MISSOURI, ILLINOIS and KANSAS.

Our 1904 Booklet mailed free on application. Address,

R. F. CHURCH, G. P. A. - Chicago.

## United Fruit Co's Steamship Lines.

CARRYING FAST UNITED STATES AND FOREIGN MAILS.

First-Class Passenger Service to Jamaica.

Weekly Sailings from Boston and Philadelphia.

Summer Rate May 1st to October 1st. { One Way, \$35  
Round Trip, \$60

FOR FULL INFORMATION APPLY TO

DIVISION PASSENGER AGENT,

Long Wharf, Boston, or Pier 5, No. Wharves, Philadelphia.

## Manitou Steamship Co.,

"The Mackinac Line."

In service the famous steel constructed  
STEAMSHIP MANITOU.

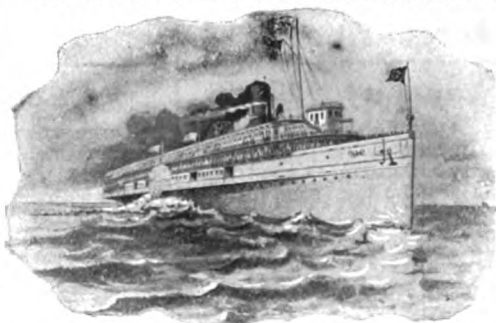
Three times each week between Chicago, Frankfort, Northport,  
Charlevoix, Petoskey, Harbor Springs and Mackinac Island.

**Passenger Service Exclusively.**

Illustrated booklets, route and rate books, containing about  
200 different combination tours to select from, mailed free for  
the asking. Address

JOS. BEROLZHEIM, G. P. A., Chicago.

## REFRESHING LAKE TOURS VIA THE D. & C. LINE STEAMERS.



FOUR TRIPS  
PER WEEK  
BETWEEN  
TOLEDO  
AND  
MACKINAC.

DAY AND  
NIGHT  
TRIPS  
BETWEEN  
CLEVELAND  
AND  
DETROIT.

FOR PARTICULARS, ADDRESS

A. A. SCHANTZ, GEN. SUPT. AND P.T.M., DETROIT, MICH.

GOODRICH  
LINE  
STEAMERS

## NINE BOATS.

Passenger and freight service between Chicago, Milwaukee, Racine, Sheboygan, Manitowoc, Green Bay Ports, Grand Haven and Muskegon.

H. W. THORP,  
Gen'l Mgr.

R. C. DAVIS,  
G. P. A.

General Office: CHICAGO, ILL.

## The Niagara, St. Catharines & Toronto Railway & Navigation Co.

First class Passenger Service  
between Toronto, Niagara Falls, N.Y.  
and Buffalo.

Fast Freight Service to all points.

FOR FURTHER INFORMATION APPLY TO

H. DAVIS, G. P. A.

W. N. WARBURTON, G. F. A.

E. F. SEIXAS, GEN. MGR.

## The Erie & Western Trans. Co.

ANCHOR LINE.

PASSENGER SERVICE Steamers.

India.	China.	Japan.	Tionesta.
Buffalo.	Erie.	PORTS OF CALL.	Cleveland.
Detroit.	Mackinac Island.		Sault Ste. Marie.
Marquette.	Houghton.		Hancock.
	Duluth.		

FREIGHT SERVICE Steamers.

Alaska.	Codorus.	Mahoning.	Senuylkill.	Conestoga.
Muncy.	Clarion.	Delaware.	Junata.	Lehigh.
Lycoming.	Susquehanna.	Wissahickon.		Conemaugh.
Buffalo.	Erie.	Cleveland.		
Sault Ste. Marie.	Marquette.	Houghton.		
Duluth.	W. Superior	Chicago.		

J. C. Evans,  
Western Manager,  
BUFFALO, N. Y.

Chas. E. Markham,  
General Passenger Agent,  
BUFFALO, N. Y.

**WARD LINE**

THE NEW YORK & CUBA MAIL  
STEAMSHIP CO.

POPULAR ROUTE TO

**CUBA, NASSAU, MEXICO**

FINEST AND LARGEST STEAMSHIPS SAILING  
FROM NEW YORK TO OTHER THAN EUROPEAN  
PORTS. HOLDERS OF THE RECORD BETWEEN  
HAVANA AND NEW YORK -- 1,240 MILES IN 61  
HOURS.

FOUR SAILINGS EACH WEEK BETWEEN  
**NEW YORK and HAVANA.**

WEEKLY SERVICE TO GUANTANAMO, SANTIAGO, MANZANILLO  
AND CIENFUEGOS, CUBA. PROGRESO, VERA CRUZ  
AND TAMPICO, MEXICO.

SEMI-MONTHLY SAILINGS TO  
**Nassau, N. P. Bahamas.**

LOW RATES OF FREIGHT AND PASSAGE.

SEND FOR OUR SCHEDULES, RATES AND DESCRIPTIVE MATTER.

**James E. Ward & Co.**

GENERAL AGENTS

90 Wall Street, NEW YORK.

**AMERICAN LINE**

PLYMOUTH  
CHERBOURG  
SOUTHAMPTON

CALLING AT CHERBOURG WESTBOUND.

Sailing From New York Every Saturday at 9:30 a. m.

**St. Louis**  
(11,629 tons)

**New York**  
(10,674 tons)

**St. Paul**  
(11,629 tons)

**Philadelphia**  
(10,433 tons)

Special Express Train from Plymouth and Southampton  
to London and between Cherbourg and Paris.

**RED STAR LINE**

NEW YORK  
ANTWERP  
PARIS

Sailing Every Saturday at 10:30 A. M.

**Finland**  
(12,760 tons)

**Vaderland**  
(12,736 tons)

**Kroonland**  
(12,760 tons)

**Zeeland**  
(11,905 tons)

One of the Shortest Routes to BELGIUM, HOLLAND, FRANCE,  
GERMANY, THE RHINE, SWITZERLAND and ITALY.

9 Broadway, New York.

Broad and Sansom Sts., Philadelphia.  
India Building, 84 State Street, Boston.  
1306 F St., N. W., Washington, D. C.  
219 St. Charles St., New Orleans  
90-98 Dearborn St., Chicago.  
Century Building St. Louis.  
Guaranty Building, S. Minneapolis.  
21 Post St., San Francisco.  
875 Robert St., St. Paul.  
41 King St., East Toronto.  
17 St. Sacrament St., Montreal.

**PIERS: 14 & 15 NORTH**

**RIVER, FOOT OF FUL-**

**TON ST., NEW YORK.**

**Mexican - American Steamship Co.,**

The Rail and Water Route to Mexico,  
via New Orleans, La., and Galveston,  
Texas.

**A. L. ROBY,**  
Vice Pres't and Mgr.  
NEW ORLEANS, LA.

**F. N. LUFKIN,**  
Sec'y and Treas.  
NEW ORLEANS, LA.

General Offices: 632 Gravier Street.  
New Orleans, La.

**New Orleans-Tampico-Vera Cruz Line**

**S. S. NOR.**

**S. S. NORHEIM.**

Freight and passenger sailings every  
two weeks, connecting with all rail-  
ways from Tampico and Vera Cruz  
for interior points.

**L. PALMER, Agent,** New Orleans, La.

**GALVESTON - TAMPICO LINE**

**S. S. IRIS.**

**S. S. FARMAND.**

Weekly Sailings.

Fast freight service from the United States  
to Mexico, via Galveston at Tampico, con-  
necting at Tampico with the Mexican  
Central Railway for all interior points.

**W. H. RICHARDSON, Agent,** Galveston, Texas.

**BOSTON STEAMSHIP CO.**

S. S. "SHAWMUT" S. S. "TREMONT" S. S. "LYRA"

Japan, South China and Manila Steamship Line

Operated in connection with the

**Northern Pacific and Great Northern  
Railway Companies.**

Monthly Passenger and Freight Service from  
Tacoma and Seattle, Washington.

New Twin-screw American Steamships of  
10,000 tons register. Exceptionally large  
staterooms, all outside.

OWING TO THE GREAT SIZE OF THE SHIPS,  
AND THE IMMENSE CARGOES CARRIED IT HAS  
NEVER BEEN NECESSARY TO USE RACKS ON  
THE DINING TABLES.

Rates at any office of

NORTHERN PACIFIC RAILWAY.

GREAT NORTHERN RAILWAY.

CHICAGO, BURLINGTON & QUINCY RAILWAY,  
THOMAS COOK & SONS, Tourists Agents.

**A. WINSOR, PRES.**  
Boston, Mass.

**F. WATERHOUSE, AGENT,**  
Seattle, Wash.



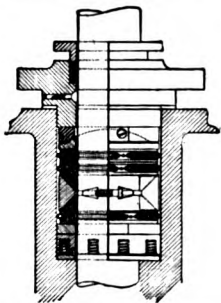
## STAR CONDENSER PACKING TOOL.

J. H. Schlosser  
Patent.



Manufactured for  
5/8-in., 3/4-in. and  
7/8-in. tubes.

This tool effects a saving of from 50 to 60 per cent. over hand work and any other tool.  
Exclusively Manufactured by **MATTESON & DRAKE, 706-707 Bourse, PHILADELPHIA.**



### Katzenstein's Self-Acting Metal Packing

For PISTON RODS, VALVE STEMS, etc. of every description for Steam Engines, Pumps, etc., etc. Adopted and in use by the principal Iron Works and Steamship Companies in this and foreign countries.

**FLEXIBLE TUBULAR METALLIC PACKING**, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also **METAL GASKETS** for all kinds of flanges and joints.

For full particulars and reference, address

**L. KATZENSTEIN & CO.**

GENERAL MACHINISTS, BRASS FINISHERS, ENGINEERS' SUPPLIES.  
358 West street, New York.

### RELIANCE MFG. CO.

MARINE GASOLINE ENGINES 4 to 150 H.P.,  
2 to 6 cylinders. Lightest weight. Simplest. Highest  
Efficiency. :: :: Special Designs for Auto Boats.

CITY ISLAND, N. Y. CITY.

### THOS. DREIN & SON.

TATNALL ST. BELOW RAILROAD, WILMINGTON, DEL.



BUILDERS OF METALLIC LIFE  
BOATS AND RAFTS, YACHTS  
AND PLEASURE BOATS.

LIFE PRESERVERS.

OUTFIT FOR LAKE STEAMERS  
A SPECIALTY.

### Neversink Cork Jackets and Life Belt.

Warranted 24 pounds. Buoyancy and full weight of Cork, as required  
by U. S. Inspectors.

Consolidated Cork Life Preservers. Ring Buoys and Fenders.

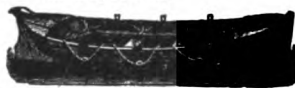
**SAFEST.**

**CHEAPEST.**

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River  
Steamer Lines as the only Reliable Life Preserver. Awarded  
four Medals by World's Columbian Exposition.



METALLIC  
and  
WOODEN  
LIFE  
BOATS.



Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the  
lightest, cheapest and most compact life raft known.

**DAVID KAHNWEILER'S SONS.**

437 Pearl Street, New York City.

Send for Illustrated Catalogue.

### PHOSPHOR BRONZE.

REG. TRADE MARKS



THE PHOSPHOR BRONZE SMELTING CO. LIMITED,  
2200 WASHINGTON AVE. PHILADELPHIA.

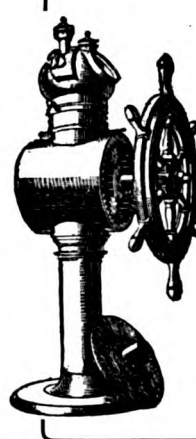
"ELEPHANT BRAND PHOSPHOR BRONZE"  
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.

— DELTA METAL —

CASTINGS, STAMPINGS AND FORGINGS.

ORIGINAL AND SOLE MAKERS IN THE U. S.

DELTA METAL



**Marine Manfg. & Supply Co.,**  
157 and 158 South St.,  
New York.

Ship Fittings and Supplies,  
Capstans, Windlasses, Steering  
Apparatus, Engine Room Tele-  
graphs, Brass Air Ports,  
Dead Lights, Pumps, etc.

Catalogue A—Air Ports, Ventilators, etc.  
Catalogue B—Windlasses, Pumps, etc.  
Catalogue C—Steering Apparatus.  
Others in course of preparation.

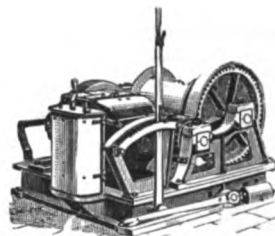
### LIDGERWOOD HOISTING ENGINES.

Over 22,000  
in use.

### ELECTRIC HOISTS

Specialty adapted for Docks, Warehouses and  
Steamships.

**Lidgerwood Miller  
Marine Cableway**



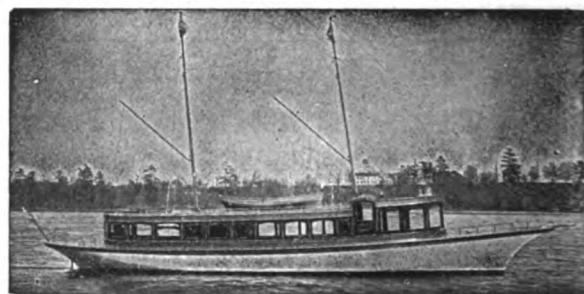
will transfer Coal, Ammunition Supplies,  
etc., from ship to ship at sea.

SEND FOR CATALOGUE.

**LIDGERWOOD MFG. CO.,**  
96 LIBERTY ST., NEW YORK.

Lidgerwood Electric Hoist.

### A TRUSCOTT BOAT.



**SIMPLE. SAFE. SPEEDY. RELIABLE.**

It may be possible to build better and safer  
boats but it hasn't been done yet. We send a  
completely illustrated catalogue and price list  
free, which tells you all about boats and why  
Truscott Boats Excel.

**TRUSCOTT BOAT MFG. CO.**

ST. JOSEPH,  
MICH.

### British Admiralty Charts

The latest Editions of Charts,  
Plans and Sailing Directions  
Published by the British Ad-

miralty. Can be obtained from  
Admiralty Agent by Appointment.

**J. D. POTTER,**

145 MINORIES, LONDON, ENGLAND.

OFFICIAL CATALOGUE OF CHARTS (380 pages) is.

An Abridged Catalogue of Charts of Nautical Books (free on application.)

## The Wm. Cramp & Sons Ship and Engine Building Co.

PHILADELPHIA, PA.

### BRASS FOUNDRY

PARSONS

MANGANES · BRONZE

PARSONS

WHITE BRASS

Propeller Castings of all kinds a specialty.

Castings and Ingots for marine and land purposes  
of high tensile strength and best composition.

## ROACH'S SHIP YARD.



Delaware  
River Iron  
Ship-Build-  
ing & En-  
gine Works  
Chester, Pa.

Builders of Steamships and Marine Machinery.

SHIP-BUILDING IN ALL ITS BRANCHES.

NEW YORK OFFICE, MORGAN IRON WORKS Foot E. Ninth St.

**Fore River Ship and Engine Co.** Successors to  
Steel Ship and Marine Engine Builders.

CONTRACTORS FOR

U. S. Torpedo Boat Destroyers Lawrence and Macdonough.  
U. S. Protected Cruiser Des Moines.  
U. S. Battleships New Jersey and Rhode Island.  
U. S. Steam Light-Vessel No. 72.

OFFICE AND WORKS, QUINCY, MASS. U. S. A.

**The Atlantic Works,** Builders of Steamships,  
..... of Steam Yachts,  
EAST BOSTON MASS. Tow Boats Etc

Marine Engines, Boilers and Tanks.  
Heavy Machinery and Plate Iron Work  
Three Marine Railways.

### A NEW MAP

showing in detail the entire

WATER FRONT OF BUFFALO, N. Y.

Sailing Sounds, Principal Buildings, Railroad Connections, Etc. A copy will  
be forwarded to responsible parties for inspection, on request.

Price, Cloth Backed, \$7.00.

Marine Review, 39-41 Wade Bldg., Cleveland, O.

### The Allen Dense-Air Ice Machine

Contains no chemicals, only air. Proven by many years' service in the  
tropics on United States men-of-war, steam yachts and passenger steamers.

A HUNDRED ARE IN DAILY SERVICE ON STEAMERS.  
**H. B. ROELKER, 41 Maiden Lane, NEW YORK**  
Consulting and Constructing Engineer. Designer and  
Manufacturer of Screw Propellers.

## THE LOCKWOOD MANUFACTURING CO.

EAST BOSTON, MASS.

ENGINEERS AND MACHINISTS.

Builders of STEAMSHIPS, TOW BOATS and MARINE ENGINES  
REPAIRING OF HULLS AND MACHINERY.

## W. & A. FLETCHER CO.

NORTH RIVER IRON WORKS.

MARINE ENGINES, BOILERS, Etc.

Hudson, 12th and 14th Streets, Hoboken, N. J.

Take Ferry from foot of West 14th St., N. Y.

## The Shipowners Dry Dock Co.

Chicago, Ill.

Building and Repairing of Steel and Wooden Ships with economy  
and dispatch.

Yard and Dry Docks: Halstead St. and North Branch.

Largest Dry Dock: 480 ft. on keel blocks.

Office, 381 No. Halstead St. Phone, North 1658.

## MANITOWOC DRY DOCK COMPANY

SHIP BUILDERS

Facilities for Repairs to Steel and Wooden Vessels.

MANITOWOC

WIS.

Office Phone { Long Distance 423. Residence { Long Distance 719-4.  
Zenith 423. Zenith 846.

### GOGEBIC STEAM BOILER WORKS,

J. F. DACEY, Manager.

Boilers, Tanks and Sheet Iron Work,  
Boiler Fronts and Grate Bars.

SPECIAL ATTENTION GIVEN TO REPAIRING.

Office and Works:  
409 LAKE AVE. SOUTH.

DULUTH, MINN.

### MASTERS AND ENGINEERS ATTENTION!

When in need of Repairs to Engine or Boiler, Call on

**THE MARINE IRON CO., Duluth, Minn.**

FOR SHOP, FOUNDRY, BLACKSMITH AND BOILER WORK.

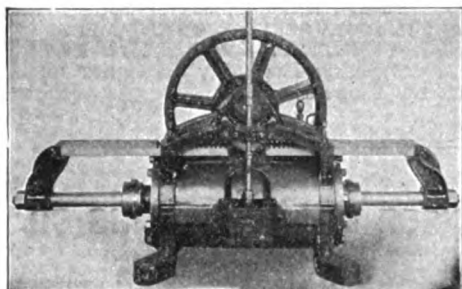
SUPPLY BOAT AVAILABLE AT ALL HOURS.

Foot of 12th Ave., on the Duluth Dredge & Dock Co. Dock  
Old Phone No. 1270.

## ICE-CRUSHING CAR FERRIES OF THE GREAT LAKES.

Complete Structural Description with Line Drawings and Photos of the Various  
Types in the Ship Building Edition of Marine Review. Price 25 cents.



**A STEAM STEERER**

**DIRECT  
and  
POSITIVE**  
QUICK ACTING.

Especially adapted for Steam Yachts, Ferryboats, Lake, Ocean and Harbor Tug Boats.

Send for Catalogue and Particulars.

**MOULTON STEERING ENGINE CO., 17 STATE STREET, NEW YORK CITY.**



**THE  
Dake Pilot House  
Steam Steerer.**

A Simple, Compact and Durable Machine. Occupies Small Floor Space.

Write for descriptive circulars and prices.

MANUFACTURED BY  
**The Dake Engine Co.**  
GRAND HAVEN, MICH.

**THE ROBERTS****Safety Water Tube Boiler Co.**

MANUFACTURERS OF

**High Grade Marine  
Water Tube Boilers.**

Generators of the Highest Quality of Steam.

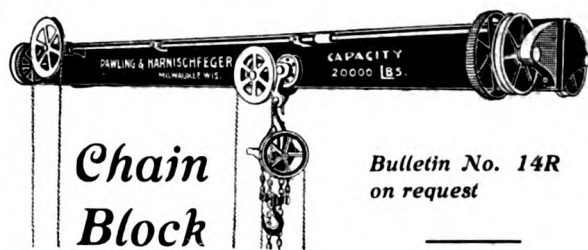
**Nearly 1500 in use.**

Send for Circulars and Stock Sheet.

Works:  
**RED BANK, N. J.**  
Phone, 49 Red Bank.

Main Office:  
39 Cortlandt St.,  
**NEW YORK, N. Y., U. S. A.**  
Phone, 599 Cortlandt.

Cable Address:  
"BRUNIVA."



**Chain  
Block**

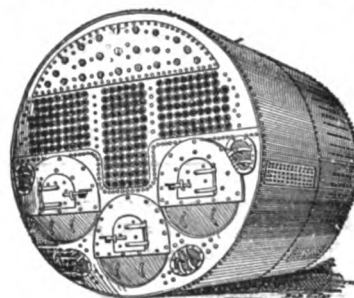
Bulletin No. 14R  
on request

**TRAVELING  
CRANES**

**PAWLING &  
HARNISCHFEGER**  
Clinton and South  
Water Streets, MIL-  
WAUKEE, WIS.,  
U. S. A.

**"FOREST CITY" MARINE PAINT**

A Paint Made Expressly for This Purpose  
**The Forest City Paint & Varnish Co.,**  
CLEVELAND, OHIO.

**Northwestern Steam Boiler & Mfg. Co.**

**DULUTH, MINN.**

MANUFACTURERS OF

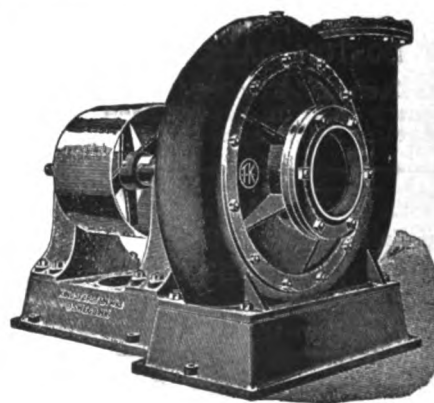
**Boilers, Engines and  
Machinery.**

Special facilities  
for Marine Work.  
Repairs promptly  
attended to Night  
or Day.

We carry a com-  
plete line of Mar-  
ine and Engineers'  
Supplies.

TELEPHONES:  
OFFICE AND WORKS, 615.  
Residence Calls:

M. A. RYAN, Pres. and Gen'l Mgr., 776 R.  
J. H. OPPERMAN, Secretary, 579 R.  
E. KRIZ, Superintendent, 557 M.



DREDGING, WRECKING  
CIRCULATING  
AND BALLAST PUMPS.

**MARINE  
BOILERS.**

**Kingsford Foundry  
& Machine Works,**  
OSWEGO, N. J.

**Patterson's  
Nautical Encyclopedia.**

PRICE, \$3.00

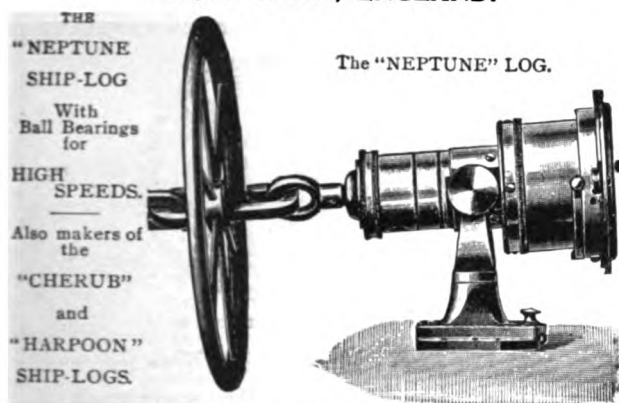
Is in all respects a work up to date, correct as to every term known to the shipping world. Sent upon approval. Carriage prepaid.

THE MARINE REVIEW

CLEVELAND.

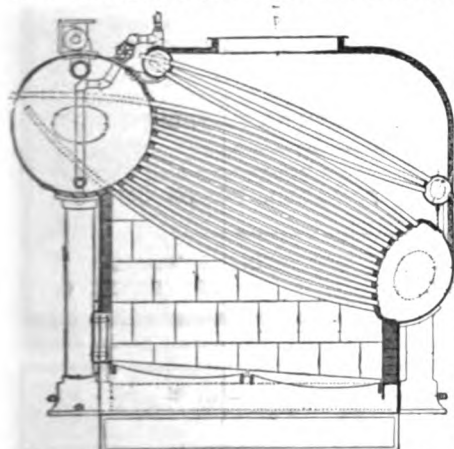
## THOMAS WALKER & SON,

BIRMINGHAM, ENGLAND.



MAKERS TO THE BRITISH NAVY.

### THE MOSHER PATENT WATERTUBE BOILER.

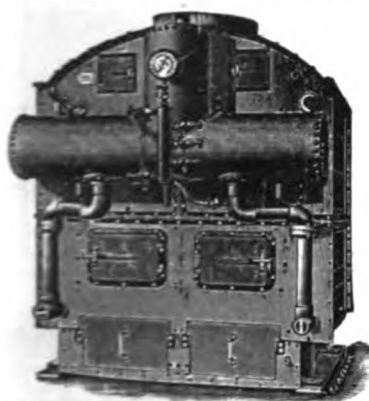


Simplest, lightest and most compact boiler made. Most accessible for cleaning and repair. Five vertical rows or as many as 45 tubes may be cleaned or withdrawn by removing the cover from a single hand hole. Largest grate surface on a given floor space. No joints in the fire. All joints expanded. Greater steam room and water capacity than any other boiler. Built in sizes up to 2000 H. P. Mosher Boilers have been supplied for eleven torpedo boats and the monitor Florida of the U.S. Navy, amounting to over 26,000 H. P.; six torpedo boats for the Russian Navy, two gunboats for the Mexican government, one cruiser and one torpedo

boat for the Brazilian government; the steam yachts Arrow, Ellide, Feisen, Wanneta, Presto, and numerous other yachts and vessels.

SEND FOR DESCRIPTIVE CATALOGUE.

MOSHER WATERTUBE BOILER CO., No. 1 BROADWAY, N. Y.



### 250 STEAM VESSELS

Now Equipped With

### ALMY'S PATENT

SECTIONAL  
Water Tube Boilers

Bear Evidence of Their

Excellent Qualities

Almy Water-Tube  
Boiler Co.

PROVIDENCE, R. I.

### Time and Distance Tables for Lake Ships

A set of tables showing the time required at different rates of speed, 8 to 15 miles an hour, to cover distances between all ports on the Great Lakes. A time saver to the vessel owner or vessel agent as well as captain or engineer. Send for it on approval.

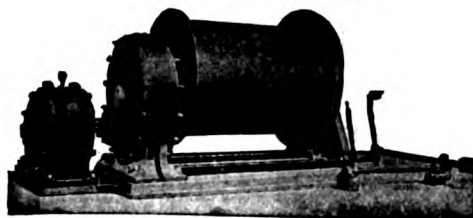
Price \$1.00

MARINE REVIEW

39-41 Wade Building,

Cleveland, Ohio

## Westinghouse Motors.



For All Power Purposes.

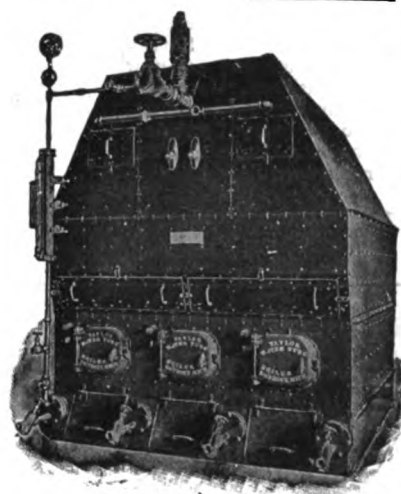
Westinghouse Electric & Mfg. Co.

Sales Offices in all Large Cities.

Pittsburgh, Pa.

For Canada: Canadian Westinghouse Co., Limited, Hamilton, Ontario.

## Taylor Water Tube Boiler Co.



322 Franklin St.,  
DETROIT, MICH.

Vertical Tubes,  
sectional, large  
steam space and  
liberating area.

Fire box, com-  
bustion chamber,  
and course for the  
furnace gases sim-  
ilar to the Scotch  
Marine.

Free circulation  
type.

Send for full description.

## The MARTIN-BARRISS CO.

IMPORTERS AND MANUFACTURERS OF

MAHOGANY, WHITE MAHOGANY  
AND ALL NATIVE CABINET WOODS

High Grades of Kiln Dried Woods for Cabin Work and Inside Trim.

White Oak Timbers and Plank

Constantly on Hand and Sawed to Order on Short Notice,

654 SENECA ST. CLEVELAND, O.

## CRANE VALVES

Questions and Answers for Marine Engineers.

By THRO. LUCAS.

Sent postpaid to any address for \$2.00.

Marine Review, 39-41 Wade Bldg. Cleveland, O.



CHARLES E. PECK.

WILLIAM A. PRIME.

**CHAS. E. & W. F. PECK,**

Insurance Brokers. Average Adjusters.

ESTABLISHED 1870.

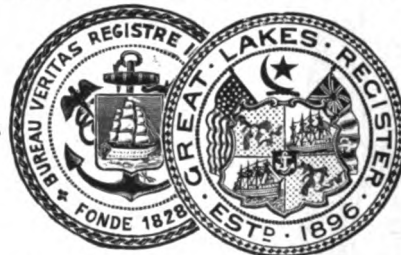
NEW YORK, 58 William Street,  
CHICAGO, 1115-16 Royal Insurance Bldg.  
CLEVELAND, 1107-8 Williamson Bldg.

REPRESENTED BY

**C. T. BOWRING & CO., (Insurance) LTD.,**  
5 and 6 Billiter Ave., LONDON,  
and at "LLOYD'S" LONDON.**HULLS and CARGOES.**We place insurances in the most advantageous markets, employ-  
ing, in the interest of our clients and with equal facility, all Foreign  
and Home companies, at the best procurable rates and terms.**We Represent Only the Assured.****NEW HARBOR CHARTS OF THE LAKES.**Following is a list of harbor charts recently  
issued from the United States Lake Survey  
Office, all in colors: Duluth and Superior  
Harbors, Two Harbors, Ashland, Marquette,  
Milwaukee, Chicago, Muskegon, Charlevoix,  
Michigan City, Toledo, Sandusky, Cleveland,  
Lorain, Fairport, Ashtabula, Conneaut, Erie,  
Dunkirk, Buffalo and Oswego.For sale by **THE MARINE REVIEW,**

39-41 WADE BUILDING,

CLEVELAND, O.

**The Only Standard American  
Classification of Shipping.**Has Authorized Agents in all the principal ports of the  
world to protect the interests of its patrons. Vessels built  
under its rules, or holding certificates of class in this Rec-  
ord of Shipping will, with their Cargoes, insure at lowest  
rates. Office, 66 Beaver Street, New York.**A. A. RAVEN, President.**  
**W. H. H. MOORE, Treasurer.****W. R. T. JONES, Vice President,**  
**W. IRVING COMBS, Secretary.****The Donnelly Salvage  
and Wrecking Co., Ltd.,****KINGSTON ONT.****DIVERS, STEAM PUMPS, TUGS, Etc.****SUPPLIED ON SHORTEST NOTICE.****JOHN DONNELLY, SR., Pres.**  
**JOHN DONNELLY, JR., Vice-Pres.**  
**H. B. FOLGER, Treas.**  
**THOS. DONNELLY, Secy.****GREAT LAKES REGISTER**FOR THE  
CLASSIFICATION OF STEEL AND WOODEN VESSELS.

Estb. 1828

Estb. 1896

COMBINED AND ISSUED IN CONNECTION WITH

**BUREAU VERITAS**

INTERNATIONAL REGISTER OF SHIPPING.

THE RATINGS OF GREAT LAKES REGISTER GO BEFORE AND  
ARE ACCEPTED BY THE LEADING UNDERWRITERS OF AMERICA  
AND EUROPE. VESSELS BUILT UNDER THE SUPERVISION OF  
ITS SURVEYORS WILL RECEIVE SPECIAL RATING, AND WILL  
ALSO BE PUBLISHED IN BUREAU VERITAS INTERNATIONAL  
REGISTER OF SHIPPING.

PLANS AND SPECIFICATIONS FURNISHED.

GREAT LAKES REGISTER SURVEYORS ARE ESTAB-  
LISHED AT ALL THE PRINCIPAL PORTS ON THE  
GREAT LAKES.**F. D. HERRIMAN, SURVEYOR GENERAL,**  
320-322 Perry-Payne Building, CLEVELAND, O.**I N S U R A N C E****GEO. L. McCURDY**

169 Jackson Boulevard

**CHICAGO ILLINOIS**Direct Representative of Leading  
American and Foreign Underwriters**HULLS AND CARGOES****CRANE FITTINGS**

ESTABLISHED 1865.

**THE FRANKFORT Marine, Accident and Plate Glass  
INSURANCE CO.**

of FRANKFORT-ON-THE-MAIN, GERMANY.

Employers, Teams and Public Liability, Elevator Insurance, Workmen's  
Collective, Individual Accident.For the security of Policyholders in the United States of America, a de-  
posit has been made in the States of Massachusetts and New York of \$400,000.00  
in United States Bonds.UNITED STATES DEPARTMENT,  
100 WILLIAM ST., NEW YORK, N. Y.**F. G. VOSS, Manager and Attorney.**

Thirty Years' Experience building



## Engines and Propeller Wheels.

H. G. TROUT,  
King Iron Works,  
226 Ohio St.,  
BUFFALO, N. Y.



## SHERIFFS MANUFACTURING CO.

Manufacturers of  
PROPELLER  
WHEELS

Marine Engines  
and Repairs.

Milwaukee, Wis.  
Phone 5. 163

## GEO. STRATFORD OAKUM CO.

JERSEY CITY, NEW JERSEY

Established  
1880



Manufacturers  
of all grades of

## Oakum

Spun  
Cotton

FOR SALE AT SHIP CHANDLERS EVERYWHERE.

## • • Buffalo • • Wrought Steel Ranges Are the Best.

Steamboat and Barge Ranges with Rotary Grates.  
No Cog Wheels to Warp or get out of order.

Don't take our word for it but ask some one using them.

**Russell & Watson,** General Steamboat Work  
BUFFALO, N. Y. Send for Catalogue.

AGENTS—Topy Bros., Ashtabula Harbor, Ohio.  
H. C. Weber & Co., Detroit, Mich.  
John Black, So. Chicago, Ill.  
Pritzlaff Bros., Milwaukee, Wis.

## AIDS TO NAVIGATION

are of vital importance to vessel interests.

### SCHERZER ROLLING LIFT BRIDGES

aid navigation and meet with the approval of all vessel interests, because of the wide and unobstructed channel provided for navigation, enabling vessels to pass easily and rapidly through the draw.

**The SCHERZER ROLLING LIFT BRIDGE Co.,**

Main Offices: 1616 Monadnock Block,  
CHICAGO, U. S. A.

## RICHELIEU AND ONTARIO NAVIGATION COMPANY.

### “Niagara to the Sea”

The unrivaled scenic trip on the American continent. Palatial Steamers leave Toronto, for Rochester, Kingston, Clayton, Alexandria Bay, thence through the Picturesque Thousand Islands (America's Venice) and the exciting descent of all the rapids of the St. Lawrence to Montreal, where connection can be made with steamer for Quebec, Murray Bay, Tadousac and Riviere du Loup, and points on the world-famous Saguenay river.

THOS. HENRY, Traffic Manager, Montreal.

## The GREAT LAKES RED BOOK for 1904

Containing names of captains, engineers and owners  
of about 2000 vessels of the Great Lakes

PRICE, \$1.00

Pigeon Hole or Vest Pocket Size

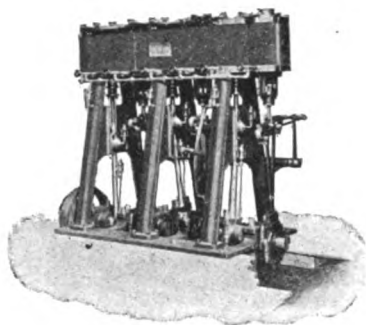
Published by the Marine Review, Cleveland

## Just Out

## Send For It Now

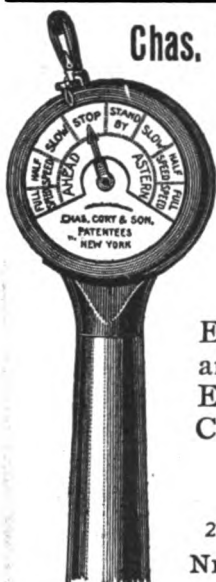


## John E. Thropp & Sons Co., TRENTON, N. J.



Builders of Single, Compound, Triple-Expansion and Direct Connected Engines.

Boyer Sectional Water Tube boilers and machinery complete for light draft Passenger Boats, Yachts, Tugs, Etc.



**Chas. Cory & Son,**

Manufacturers of  
Mechanical  
and  
Electrical  
Telegraphs  
and  
Indicators.

Engine Bells  
and  
Electric  
Call Bells.

278-279 Division St.  
NEW YORK CITY.

**A. J. MORSE & SON.**  
DIVING APPARATUS  
140  
CONGRESS ST. BOSTON.

ORAM FIX. ESTABLISHED 1860. J. W. FIX.  
**S. FIX'S SONS,**  
SUCCESSORS TO S. FIX & SON  
**Steam Flue Welding Works**  
Our Work Stands Government Test.  
Our Welds are Perfectly Smooth.  
Write us for Prices.  
COR. LEONARD  
AND WINTER STS. **Cleveland, O.**

## Oil vs Grease

**A New Booklet upon  
an Old Subject.**

With especial reference to  
an interesting discussion.

**Dixon's Graphite Greases.**

Copies upon request.

**Joseph Dixon Crucible Co.,**  
Jersey City, N. J.

Please mention this paper.

**WATER  
FILTERS  
REGULATORS  
& ENGINES**

We make **Pressure Regulating Valves**  
for all purposes, steam or water.

Our **Feed-Water Filter** will keep oil  
out of your boiler.

We can interest you if you use a condenser.

**Water Engines for Pumping Organs**



**THE ROSS VALVE CO. TROY N. Y.**

Keep Oil out of your Boiler  
with the  
**FEED-WATER FILTER**  
For Marine and Land Service  
Two of these Filters are  
in use on the Oceanic.

**LUNKENHEIMER**

The "Alpha" is the original and simplest form of oil pump made and can only be attached in a vertical position. The "Universal" can be attached either in a vertical or horizontal position by transposing of plug and shank, which interchange. Both styles are easy to fill and constructed to satisfy. Made in four sizes holding  $\frac{1}{8}$ ,  $\frac{1}{2}$ , 1 pint, 1 quart of oil. Specify *Lunkenheimer* and order from your dealer. Write for catalog.

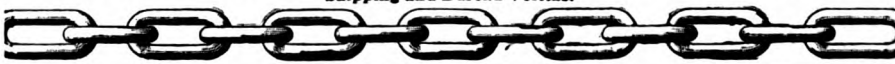
The **Lunkenheimer Company,**  
Largest Manufacturers of  
Engineering Specialties in the World,  
CINCINNATI, O., U. S. A.  
Branches: { New York, 26 Cortlandt St.  
London, 35 Great Dover St.

**GLASS BODY  
OIL PUMPS**

UNIVERSAL ALPHA

**LEBANON CHAIN WORKS,**  
LEBANON PA.

Manufacturers of HAND MADE CHAINS of all grades.  
**SHIPS' CABLES, DREDGE CHAINS, CRANE CHAINS, BLOCK CHAINS.**  
Large chains furnished side or end welded. High grade tested chains a specialty.  
We manufacture our own iron. We are licensed testers for Lloyds Association, American Bureau of Shipping and Bureau Veritas.



**BUFFALO DREDGING CO.**  
GENERAL CONTRACTORS ON SUBMARINE WORK.  
**Office D. S. MORGAN BLDG. BUFFALO, N. Y.**

John D. Gilchrist, Pres. John Marron, Sec'y.  
John A. Flajole, Gen'l Mgr.

**THE FOREST CITY BOILER CO.**

Marine Work a Specialty.

264 Merwin St. Tel. Main 1886  
CLEVELAND, OHIO.

**STEEL SHIPS: Their Construction  
and Maintenance.**

A manual for ship builders, ship superintendents, students and marine engineers.

BY THOMAS WALTON.

Price \$5.50.

The Marine Review, Cleveland, O.

## RITCHIE LIQUID COMPASS



The Standard Liquid Compass  
Used Exclusively by the United  
States Navy For Over  
35 Years.

Over 25,000 Used in Mer-  
chant Service.

Made in all sizes and  
styles, from 2 to 12 inches  
diameter of card. All com-  
passes made by us have  
our name printed below  
the North point, or promi-  
nently upon the card.  
**NONE OTHER  
ARE GENUINE.**  
Latest form with four or  
For sale by ship chandlers

six needles, the best instrument for iron ships.  
and nautical instrument dealers.

CATALOGUE FREE.

### E. S. RITCHIE & SONS,

Manufacturers of Nautical and Physical Apparatus,  
BROOKLINE, MASS., U. S. A.

### Steamboat Fuel at Ashtabula.

Large Supplies of Best Quality.

Lighter Carrying Different  
Grades at all Times.



Fuel Scow with elevators and discharging spouts. Storage of 800 tons.  
Discharges 250 tons an hour into steamers while unloading cargo.

**M. A. Hanna & Co., Miners and Shippers,**  
Main Office, Perry-Payne Bldg., Cleveland.

## STEAMBOAT FUEL

at TOLEDO and HURON.

### IRONVILLE DOCK & COAL CO.,

429 Spitzer Building, Toledo, Ohio.

Office, Main 1513. : : : Bell Phones : : : Dock, East 63.

Coal of Best Quality MASSILLON & PITTSBURG No. 8.



IRON ON STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.  
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

J. B. COWLE, Pres.

W. E. PERKINS, Sec'y and Treas  
MAT. THOMAS, Gen'l Mgr.

## The Union Machine & Boiler Company,

MACHINISTS, FOUNDERS AND BOILER MAKERS.

Jobbing solicited. Steel vessel repairs promptly attended to night or day.

108 TO 114 RIVER STREET. CLEVELAND, O.

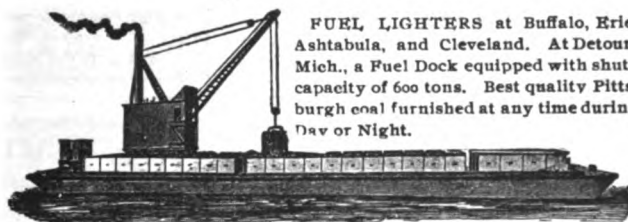
Phones: Bell Main 609. Cuy. A. 711. Night Call Cuy. M. 1848.

### HOISTING ENGINES.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a hoist for marine work, dock work, mining, or any other purpose, kindly permit us to name you prices. We know we can please you.

MARINE IRON CO., - - - Bay City, Mich.

## PICKANDS, MATHER & CO.,



FUEL LIGHTERS at Buffalo, Erie,  
Ashtabula, and Cleveland. At Detour,  
Mich., a Fuel Dock equipped with shute  
capacity of 600 tons. Best quality Pitts-  
burgh coal furnished at any time during  
Day or Night.

Western Reserve Building, CLEVELAND, O.

## HAWKINS' WORKS FOR ENGINEERS.

Most popular among young men in the engine departments of ships is  
"Engineers' Examinations with Questions and Answers." It sells at  
\$2 and the same is the cost, delivered, of the following works:

Hawkins' New Catechism of Electricity.

Hawkins' Maxims and Instructions for the Boiler Room.

Hawkins' Hand Book of Calculations for Engineers.

Hawkins' New Catechism of the Steam Engine.

THE MARINE REVIEW, CLEVELAND, O.

## De Grauw, Aymar & Company.

ESTABLISHED 1827.

**Cordage, Oakum, Vessel  
and Railroad Supplies.**

SOLE MANUFACTURERS IN THE UNITED  
STATES FOR  
**TYZACK'S STOCKLESS ANCHORS.**  
NEW YORK CITY.

BETTER and More ECONOMICAL than DRILLED BOLTS



FALLS HOLLOW BOLTS are self-inspectors. Afford protection against  
explosions. Are of uniform strength and flexibility. Hole is central, admits  
air, which aids combustion. Superior quality guaranteed. Samples of either  
Hollow or Solid furnished on application. Ask for our latest price list.



## VESSEL AND INSURANCE AGENTS.

**T. R. MCCARTHY,**  
*Steamship and Freight Broker,*  
*Chartering, Forwarding and General Com-*  
*mission Agent; and Broker for the Sale,*  
*Purchase and Construction of Steam-*  
*ers and Sailing Vessels.*  
*Marine and Fire Insurance Effected.*  
 Cable Address, "Macarthy, Montreal."  
 (Watkins', Scott's Liebers and A. B. C.  
 Codes Used.)  
*Shipping Agent to The Asbestos & Asbestic*  
*Co., Ltd., of Danville, Que., and The Belgo*  
*Pulp & Paper Co., Shawinigan Falls, Que.*  
 404 Board of Trade Bldg., MONTREAL, CAN.  
*Correspondence Invited and Agencies Solicited.*

**S. S. LESTER,**  
*Steamship Agent and Freight Broker.*  
 Manager Steamer  
**ST. LAWRENCE,**  
 83 Dalhousie St. QUEBEC, QUE.

*Insurance.*  
**PRINDIVILLE & COMPANY,**  
*Average Adjusters.*  
*Insurance Brokers.*  
 12 Sherman Street,  
 CHICAGO.  
*Representing:*  
 Johnson & Higgins, New York.  
*Represented by:*  
 Willis Faber & Co., Ltd., London.  
 Jno. D. Tyson & Co., Liverpool.

**P. H. FLEMING & CO.**  
*Insurance and Vessel Agents.*  
*Marine, Fire, Ocean, Liability.*  
 Telephone, Harrison 1859.  
 No. 2 Sherman St., CHICAGO, ILL.

C. W. Elphicke. J. J. Rardon. M. C. Reuter.  
**C. W. ELPHICKE & CO.**  
*Vessel and Insurance Agents.*  
 No. 6 Sherman St., CHICAGO, ILL.  
 Telephone, Harrison 1194.

D. Sullivan. F. J. Sullivan.  
**D. SULLIVAN & CO.**  
*Vessel Agents.*  
*Marine Insurance.*  
 2-4 Sherman St., CHICAGO, ILL.  
 Office Tel., Harrison 2847. Res. Ashland 2483.

W. A. Hawgood. Arthur H. Hawgood.  
**W. A. HAWGOOD & CO.**  
*Vessel and Insurance Agents.*  
 220-21 Perry-Payne Bldg., Cleveland, O.  
 (Office, Main 2395.  
 Telephones. { Res. W. A. Hawgood, Doan 84-J.  
 { Res. A. H. Hawgood, Doan 841-J.)

J. Mitchell. J. F. Wedow. A. Mitchell.  
**MITCHELL & CO.**  
*Vessel and Insurance Agents.*  
 508-10 Perry-Payne Bldg., Cleveland, O.  
 Office Tel. M. 767. Res. John Mitchell, Doan 841.  
 John F. Wedow, Doan 141-J.  
 Alfred Mitchell, Doan 218

## VESSEL AND INSURANCE AGENTS.

C. L. Hutchinson. W. H. McGean.  
**HUTCHINSON & CO.**  
*Vessel and Insurance Agents.*  
 (Office, Main 2453.  
 Phones: { Res. C. L. Hutchinson, Ridge 845 L.  
 { Res. W. H. McGean, East 1421-J.  
 313-15 Perry-Payne Bldg., Cleveland, O.

**W. C. RICHARDSON,**  
*Vessel Owner and Broker and*  
*Marine Insurance Agent.*  
 420-421 Perry Payne Building,  
 CLEVELAND, O.  
 Office Tel., 338, Residence Tel., 2988.

**C. P. GILCHRIST & CO.**  
*Vessel and Insurance Agents.*  
*Sale and Exchange of Vessels a Specialty.*  
*Lumber and Coal Chartering.*  
 Full Telephone Service, Office and Residence.  
 (Local and Long Distance.)  
 411 Perry-Payne Bldg., Cleveland, O.

John B. Hall. Harry B. Root.  
**HALL & ROOT,**  
*Vessel Agents.*  
 21-22 Exchange Bldg., 202 Main St.,  
 Telephone, Seneca 892. BUFFALO, N. Y.

**JOHN J. BOLAND,**  
*Vessel and Insurance Agent.*  
 25-26 Exchange Bldg., 202 Main St.,  
 Telephone, Seneca 115. BUFFALO, N. Y.

**PARKER BROS. CO., LTD.,**  
*Vessel, Marine Insurance and Wreck-*  
*ing Agents Marine Surveyors*  
 Office Tel. Main 5814. Night: Main 280.  
 Night: Grand 1723 J.  
 15 Atwater St. West, DETROIT, MICH.

**D. T. HELM & CO.**  
*Vessel and Insurance Agents.*  
 Telephones—Office 268  
 Res. 331-3.  
 DULUTH, - - - MINN.

**SAMUEL HOLMES,**  
*Steamship Offices,*  
*For Selling, Chartering and Building all*  
*Classes Steam Vessels*  
*Steam Vessel Circulars*  
*Weekly Freight Circulars*  
 Morris Bldg, 66-8 Broad St., New York.

**F. H. WEEKS,**  
*Marine Broker.*  
*Vessels Sold, Chartered Built and Insured.*  
 Cable Address, WEEKSHIP, New York.  
 Telephone, 3275 Broad.  
 32 Broadway, NEW YORK.

Charles P. Notman. David H. E. Jones.  
**JAMES W. ELWELL & CO.**  
 Established 1890.  
*Ship Brokers and Steamship Agents.*  
*Sell and Charter All Classes of Vessels*  
*Agents for Cyprien Fabre & Cie. S.S. Line, Cie.*  
*Havraise Peninsulaire and Northwestern S. S.*  
 Co. 21-24 State Street, NEW YORK.

## PROCTORS IN ADMIRALTY.

**WILLIAM H. FAUST,**  
 Lieutenant United States Navy, (ret.)  
*Counselor and Proctor in Admiralty.*  
 Room 344 Federal Building,  
 BUFFALO, N. Y.

**C. E. KREMER,**  
*Counselor at Law and*  
*Proctor in Admiralty.*  
 Suite 821-822 New York Life Bldg.,  
 CHICAGO, ILL.

**HOYT, DUSTIN & KELLEY,**  
*Lawyers and Proctors in Admiralty.*  
 Offices, 702 Western Reserve Building,  
 CLEVELAND, O.

**WHITE, JOHNSON,**  
**MCCASLIN & CANNON,**  
*Attorneys-at-Law and*  
*Proctors in Admiralty.*  
 Williamson Bldg, CLEVELAND, O.

**GOULDER, HOLDING &**  
**MASTEN,**  
*Law Offices*  
 H. D. Goulder. S. H. Holding. F. S. Masten.  
 Perry Payne Building,  
 CLEVELAND, O.

**ALBERT J. GILCHRIST,**  
*Proctor in Admiralty.*  
 604 Perry Payne Building,  
 CLEVELAND, O.

**HAND BOOK**  
 OF  
**ADMIRALTY LAW,**

by

ROBT. M. HUGHES,

Price, \$3.75

THE PENTON PUB. CO.,  
 Cleveland, O.

**MARINE INSURANCE,**  
 by  
**WILLIAM GOW.**  
 Price, \$1.50  
 THE PENTON PUB. CO.,  
 Cleveland, O

## PROCTORS IN ADMIRALTY.

Geo. S. Potter. Meredith Potter.  
**POTTER & POTTER,**  
*Lawyers and Proctors in Admiralty.*  
 35-36 Dan Building, 110 Pearl Street,  
 BUFFALO, N. Y.

**RAY G. MacDONALD,**  
*Attorney-at-Law and*  
*Proctor in Admiralty.*  
 630 First National Bank Building,  
 Telephone, Central 2507  
 Automatic 1085 CHICAGO, ILL.

**SHAW, WARREN, CADY &  
 OAKES,**  
*Attorneys-at-Law.*  
 904 to 907 Union Trust Building,  
 Telephone, 625. DETROIT, MICH.

**NAVAL ARCHITECTURE,**  
 by  
**THOS. H. WATSON.**  
 A manual on laying off iron and steel ves-  
 sels. Valuable for naval architects as well as  
 engineers in ship yards.  
 Price, \$5.00  
 Order from  
**THE PENTON PUB. CO.,**  
 Cleveland, O.

**COMPASS ADJUSTER.**  
**CAPT. J. M. FIELDS**  
 INVENTOR OF AND AGENT FOR  
*Field's Patent Course Finder.*  
 The Bethel, CLEVELAND, O.

## PROFESSIONAL.

**W. J. WOOD,**  
*Naval Architect, Consulting Engineer.*

Prepares designs or working drawings and  
 specifications for all classes of vessels and  
 superintends construction and repairs. Sur-  
 veys damaged property and estimates cost of  
 repairs. Arbitrator and court expert.

**FIRE BOATS A SPECIALTY.**  
 Complete Plans furnished for Steel, Compo-  
 site or Wooden Vessels.  
 709 Rialto Building, CHICAGO.  
 Tel. Harrison 1020.

**HENRY RICE and  
 H. O. LOVEJOY,**  
*Naval Architects.*  
*Consulting Engineers.*

Surveyors of Wood and Steel Ships, Engines  
 and Boilers. Estimates of cost given. Super-  
 intendence of building and repairing. Plans  
 and specifications furnished for all classes  
 of ships.

Lines and models furnished.  
 Room 18,  
 202 Main Street., BUFFALO, N. Y.

**JOSEPH KIDD,**  
*Marine Architect and Surveyor.*  
*Consulting Ship Builder and Engineer*

Over thirty years' experience. Specifica-  
 tions, designs and estimates. Superintendence  
 of construction and repairs. Damage and  
 other surveys carefully attended to. Nego-  
 tiations for the building, charter or sale of all  
 kinds of vessels and machinery.

610 Board of Trade,  
 DULUTH, MINN.

**ROBERT W. HUNT & CO.,**  
*Bureau of Inspection.*  
*Tests and Consultation.*

1121 The Rookery, CHICAGO.  
 Monong. Bank Bldg., PITTSBURG.  
 66 Broadway, NEW YORK.

Inspectors of shipbuilding material and  
 machinery. Inspectors of all materials. Duty  
 tests of engines and boilers. Physical and  
 chemical laboratories.

**AMBROSE V. POWELL,**  
 Member American Society Civil Engineers  
*Civil Engineer.*  
 Designs and Constructs Dry Docks, Harbor  
 Works, Docks, and Plant for Handling Coal  
 and Ore, Foundations  
 Office, 1008 Chamber of Commerce,  
 CHICAGO, ILL.

## PROFESSIONAL.

H. Matteson, Jr. Geo. B. Drake.  
**MATTESON & DRAKE,**

*Naval Architects and*  
*Consulting Engineers.*

Designing and Superintendence of building  
 and repairing steel and wooden vessels.

Bulk oil vessels a specialty.

Agents for marine specialties.

706-707 Bourse, PHILADELPHIA.

**ADAM STEEL, JAS. NACEY,  
 ALEXANDER HYND,**

*Marine Architects.*  
*Mechanical Draughtsmen.*  
*Consulting Engineers.*

Specifications and designs for all descrip-  
 tions of marine vessels, engines and boilers.  
 Supervision of construction and repairs. Da-  
 mage and other surveys carefully attended to.

208-9 Western Reserve Building,  
 CLEVELAND, O.

Phone, Main 3330 J.

**PITTSBURGH TESTING  
 LABORATORY, Ltd.,**

*Inspecting and Metallurgical*  
*Engineers and Chemists.*

Inspectors of shipbuilding materials and  
 machinery. Inspectors located at all mills.  
 Physical and chemical laboratories. Tests  
 of all kinds.

1750 Monadnock, CHICAGO.  
 235 Water Street, PITTSBURG.

906-7 Crozier Building, Philadelphia,  
 New York City, 60 New Street,  
 Richmond, Va., 1107 1/2 Main Street.

Members Maritime Association Port of N. Y.  
**SADLER, PERKINS  
 & FIELD,**  
*Naval Architects and Engineers.*  
*Chartering and Brokerage.*  
 Maritime Bldg., New York.  
 NEW YORK. DETROIT.

**NAVAL ARCHITECTS' AND  
 ENGINEERS' DATA BOOK,**

By T. H. WATSON.

Price, \$1.50

THE PENTON PUB. CO.,  
 Cleveland, O.

## PATENTS.



# Buyers' Directory of the Marine Trade

For a more complete classification than that represented by advertisers in the Marine Review, see the **BLUE BOOK OF AMERICAN SHIPPING**, marine and naval directory of the United States, published by the Marine Review, 39-41 Wade Bldg., Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

## AIR COMPRESSORS, AIR HOISTS, ETC.

Dake Engine Co. .... Grand Haven, Mich.  
Great Lakes Engineering Works. .... Detroit.  
Mietz, Aug. .... New York.

## AIR PORTS, DEAD LIGHTS, ETC.

Marine Mfg. & Supply Co. .... New York.

## AIR PUMPS AND APPLIANCES.

Fore River Ship & Engine Co. .... Quincy, Mass.  
Great Lakes Engineering Works. .... Detroit.

## ANCHORS.

Baldt Anchor Co. .... Chester, Pa.  
Bowers, L. M. & Co. .... Binghamton, N. Y.  
DeGrauw, Aymar & Co. .... New York.  
Seaboard Steel Casting Co. .... Chester, Pa.

## ANTI-FRICTION METALS.

Cramp, Wm. & Sons. .... Philadelphia.  
Phosphor Bronze Smelting Co., Ltd. ....  
Victor Metals Co. .... Braintree, Mass.

## ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co. .... Cleveland.  
Detroit Ship Building Co. .... Detroit.  
Great Lakes Engineering Works. .... Detroit.  
Sturtevant, B. F., Co. .... Hyde Park, Mass.

## ASH EJECTORS.

Great Lakes Engineering Works. .... Detroit.

## ATTORNEYS AND PROCTORS IN ADMIRALTY.

Faust, Lieut. Wm. H. .... Buffalo.  
Gilchrist, Albert J. .... Cleveland.  
Goulder, Holding & Masten. .... Cleveland.  
Hoyt, Dustin & Kelley. .... Cleveland.  
Kremer, C. E. .... Chicago.  
MacDonald, Ray G. .... Chicago.  
Potter & Potter. .... Buffalo.  
Shaw, Warren, Cady & Oakes. .... Detroit.  
White, Johnson, McCaslin & Cannon Cleveland.

## BAROMETERS, MARINE GLASSES, ETC.

Ritchie, E. S. & Sons. .... Brookline, Mass.

## BELTING, RUBBER.

New York Belting & Packing Co. .... New York.

## BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co. .... Boston, Mass.  
Cleveland Block Co. .... Cleveland.

## BLOWERS.

Sturtevant, B. F. Co. .... Hyde Park, Mass.

## BOAT BUILDERS.

Drein, Thos. & Son. .... Wilmington, Del.  
Kahnweiler's Sons, David. .... New York.  
Lane & DeGroot. .... Long Island City, N. Y.  
Marine Construction & D. D. Co. ....  
Mariner's Harbor, S. I., N. Y.  
Truscott Boat Mfg. Co. .... St. Joseph, Mich.  
Willard, Chas. P. & Co. .... Chicago.

## BOILER MANUFACTURERS.

Almy Water Tube Boiler Co. .... Providence, R. I.  
American Ship Building Co. .... Cleveland.  
Atlantic Works. .... East Boston, Mass.  
Babcock & Wilcox Co. .... New York.  
Bertram Engine Works Co., Ltd. .... Toronto, Can.  
Chicago Ship Building Co. .... Chicago.  
Cramp, Wm. & Sons. .... Philadelphia.  
Delauney, Belleville & Co. .... St. Denis, France.  
Detroit Ship Building Co. .... Detroit.  
Fletcher, W. A. & Co. .... Hoboken, N. J.  
Fore River Ship & Engine Co. .... Quincy, Mass.  
Forest City Boiler Co. .... Cleveland.  
Georgian Bay Engineering Works. ....  
Midland, Ont.  
Gogebic Steam Boiler Works. .... Duluth, Minn.  
Great Lakes Engineering Works. .... Detroit.  
Yenks Ship Building Co. .... Port Huron, Mich.  
Kingsford Foundry & Machine Works. ....  
Oswego, N. Y.

## BOILER MANUFACTURERS—Continued.

Milwaukee Dry Dock Co. .... Milwaukee.  
Mosher Water Tube Boiler Co. .... New York.  
Newport News Ship Building Co. ....  
Newport News, Va.  
Northwestern Steam Boiler & Mfg. Co. .... Duluth, Minn.  
Roberts Safety Water Tube Boiler Co. ....  
New York.  
Stirling, The Co. .... Chicago.  
Superior Ship Building Co. .... Superior, Wis.  
Taylor Water Tube Boiler Co. .... Detroit.  
Union Machine & Boiler Co. .... Cleveland.  
United States Ship Building Co. .... New York.  
Willard, Chas. P. & Co. .... Chicago.

## BOILER COMPOUNDS.

Dearborn Drug & Chemical Works. .... Chicago.

## BOILER RIVETS.

Bourne-Fuller Co. .... Cleveland.

## BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co. .... Cuyahoga Falls, O.

## BOILER TUBES.

Bourne-Fuller Co. .... Cleveland.

## BOOKS, NAUTICAL AND ENGINEERING.

Marine Review Pub. Co. .... Cleveland.

## BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons. .... Philadelphia.  
Fore River Ship & Engine Co. .... Quincy, Mass.  
Great Lakes Engineering Works. .... Detroit.  
Lunkenheimer Co. .... Cincinnati.  
Macbeth Iron Co. .... Cleveland.  
Phosphor Bronze Smelting Co. .... Philadelphia.  
Victor Metals Co. .... Braintree, Mass.

## BRIDGES, BUILDERS OF.

Scherzer Rolling Lift Bridge Co. .... Chicago.

## BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co. ....  
Cleveland.  
Forest City Boiler Co. .... Cleveland.  
Macbeth Iron Co. .... Cleveland.

## CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co. .... Cleveland.

## CAPSTANS.

American Ship Windlass Co. .... Providence, R. I.  
Hyde Windlass Co. .... Bath, Me.  
Marine Mfg. & Supply Co. .... New York.

## CEMENT, IRON FOR REPAIRING LEAKS.

Smooth-On Mfg. Co. .... Jersey City, N. J.

## CHAINS.

Lebanon Chain Works. .... Lebanon, Pa.

## CHAIN HOISTS.

Boston & Lockport Block Co. .... Boston, Mass.  
Dake Engine Co. .... Grand Haven, Mich.

## CHARTS.

Marine Review Pub. Co. .... Cleveland.  
Potter, J. D. .... London.

## CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.

Ashton Valve Co. .... Boston.  
Ritchie, E. S. & Sons. .... Brookline, Mass.  
Standard Gauge Mfg. Co. .... Syracuse, N. Y.

## COAL PRODUCERS AND SHIPPERS.

Hanna, M. A. & Co. .... Cleveland.  
Pickands, Mather & Co. .... Cleveland.  
Pittsburg Coal Co. .... Cleveland.

## COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co. (Inc.) ....  
Cleveland.  
Lidgerwood Mfg. Co. .... New York.  
Macbeth Iron Co. .... Cleveland.

## COMPASS ADJUSTERS.

Fields, Capt. J. M. .... Cleveland.

## COMPASSES.

Ritchie, E. S. & Sons. .... Brookline, Mass.

## CONCRETE MIXERS.

Contractors Supply & Equipment Co. .... Chicago.

## CONDENSORS.

Great Lakes Engineering Works. .... Detroit.  
Thropp & Sons Co., John E. .... Trenton, N. J.

## CONTRACTORS SUPPLIES.

Contractors Supply & Equipment Co., Chicago.

## CONTRACTORS FOR PUBLIC WORKS.

Buffalo Dredging Co. .... Buffalo.  
Chicago & Gt. Lakes Dredge & Dock Co. ....  
Chicago.  
Dunbar & Sullivan Dredging Co. .... Buffalo.  
Fitz-Simons & Connell Co. .... Chicago.  
Hickler Bros. .... Sault Ste. Marie, Mich.  
Smith Co., L. P. & J. A. .... Cleveland.  
Starke Dredge & Dock Co., C. H. .... Milwaukee.  
Sullivan, M. .... Detroit.

## CORDAGE.

Baker & Co., H. H. .... Buffalo.  
DeGrauw, Aymar & Co. .... New York.  
Upson-Walton Co. .... Cleveland.

## CORK JACKETS AND RINGS.

Armstrong Cork Co. .... Pittsburg, Pa.  
Kahnweiler's Sons, D. .... New York.

## COURSE FINDER.

Field's Patent Course Finder. .... Cleveland.

## CHAIN CONVEYORS, HOISTS.

Brown Hoisting Machinery Co. (Inc.) ....  
Cleveland.  
General Electric Co. .... Schenectady, N. Y.  
Lidgerwood Mfg. Co. .... New York.  
Westinghouse Electric & Mfg. Co. ....  
Pittsburg, Pa.

## CRANES, TRAVELING.

Brown Hoisting Machinery Co. .... Cleveland.  
Lidgerwood Mfg. Co. .... New York.  
Pawling & Harnischfeger. .... Milwaukee.

## DIVING APPARATUS.

Morse, A. J. & Son. .... Boston.  
Schrader's Son, A. .... New York.

## DREDGING CONTRACTORS.

Buffalo Dredging Co. .... Buffalo.  
Chicago & Gt. Lakes Dredge & Dock Co. ....  
Chicago.  
Dunbar & Sullivan Dredging Co. .... Buffalo.  
Fitz-Simons & Connell Co. .... Chicago.  
Hickler Bros. .... Sault Ste. Marie, Mich.  
Smith Co., L. P. & J. A. .... Cleveland.  
Starke Dredge & Dock Co., C. H. .... Milwaukee.  
Sullivan, M. .... Detroit.

## DRYING APPARATUS.

Bayley & Sons Co., Wm. .... Milwaukee, Wis.  
Sturtevant, B. F., Co. .... Hyde Park, Mass.

## DRY DOCKS.

American Ship Building Co. .... Cleveland.  
Atlantic Works. .... East Boston, Mass.  
Buffalo Dry Dock Co. .... Buffalo.  
Chicago Ship Building Co. .... Chicago.  
Craig Ship Building Co. .... Toledo, O.  
Cramp, Wm. & Sons. .... Philadelphia.  
Detroit Ship Building Co. .... Detroit.  
Great Lakes Engineering Works. .... Detroit.  
Lockwood Mfg. Co. .... East Boston, Mass.  
Manitowoc Dry Dock Co. .... Manitowoc, Wis.  
Milwaukee Dry Dock Co. .... Milwaukee.  
Newport News Ship Building Co. ....  
Newport News, Va.  
Shipowners Dry Dock Co. .... Chicago.  
Superior Ship Building Co. .... Superior, Wis.  
United States Ship Building Co. .... New York.

## Buyers' Directory of the Marine Trade.—Continued.

**ELECTRIC HOISTS AND CRANES.**

General Electric Co. ....Schenectady, N. Y.  
 Edgerwood Mfg. Co. ....New York.  
 Pawling & Harnischfeger. ....Milwaukee.  
 Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.

**ELECTRIC LIGHT AND POWER PLANTS.**

Bayley & Sons Co. ....Milwaukee, Wis.  
 General Electric Co. ....Schenectady, N. Y.  
 Metz, Aug. ....New York.  
 Sturtevant, B. F. Co. ....Hyde Park, Mass.  
 Thropp & Sons, John E. ....Trenton, N. J.  
 Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.

**ENGINE BUILDERS, MARINE.**

American Ship Building Co. ....Cleveland.  
 Atlantic Works ....East Boston, Mass.  
 Bertram Engine Works Co., Ltd. ....Toronto, Can.  
 Chicago Ship Building Co. ....Chicago.  
 Chase Machine Co. ....Cleveland.  
 Cramp, Wm. & Sons. ....Philadelphia.  
 Craig Ship Building Co. ....Toledo, O.  
 Lake Engine Co. ....Grand Haven, Mich.  
 Detroit Ship Building Co. ....Detroit.  
 Fletcher, W. & A. Co. ....Hoboken, N. J.  
 Erie River Ship & Engine Co. ....Quincy, Mass.  
 Great Lakes Engineering Works Detroit, Mich.  
 H. Bros. ....Philadelphia.  
 Jinks Ship Building Co. ....Port Huron, Mich.  
 Lockwood Mfg. Co. ....East Boston, Mass.  
 Macbeth Iron Co. ....Cleveland.  
 Metz, Aug. ....New York.  
 Milwaukee Dry Dock Co. ....Milwaukee.  
 Mosher, Chas. D. ....New York.  
 Moulton Steering Engine Co. ....New York.  
 Newport News Ship Building Co. ....Newport News, Va.  
 Northwestern Steam Boiler & Mfg. Co. ....Duluth, Minn.  
 Ruch's Ship Yard ....Chester, Pa.  
 Smiths Mfg. Co. ....Milwaukee.  
 Superior Ship Building Co. ....Superior, Wis.  
 Thropp, J. E. & Sons Co. ....Trenton, N. J.  
 Tread, H. G. ....Buffalo.  
 United States Ship Building Co. ....New York.  
 Willard, Chas. P. & Co. ....Chicago.

**ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.**

Chas. & Son. ....New York.  
 Marine Mfg. Supply Co. ....New York.

**ENGINEERING SPECIALTIES AND SUPPLIES.**

Crane Co. ....Chicago.  
 Foley & Mueller. ....New York.  
 Lunkenheimer Co. ....Cincinnati.  
 Meters & Co., H. ....Milwaukee.  
 New York Belting & Packing Co. ....New York.  
 Northwestern Steam Boiler & Mfg. Co. ....Duluth, Minn.

**ENGINEERS, MARINE, MECHANICAL, CONSULTING.**

Bond, Alexander. ....Cleveland.  
 East, Robt. W. & Co. ....Chicago.  
 Firth, Joseph. ....Duluth, Minn.  
 Gregory, H. O. ....Buffalo.  
 Matheson & Drake. ....Philadelphia.  
 Mosher, Chas. D. ....New York.  
 Naley, James. ....Cleveland.  
 Pittsburgh Testing Laboratory, Ltd. ....Pittsburg.  
 Rice, Henry. ....Buffalo.  
 Roelker, H. B. ....New York.  
 Sayer, Perkins & Field. ....New York.  
 Steel, Adam. ....Cleveland.  
 Wood, W. J. ....Chicago.

**FANS FOR VENTILATION, EXHAUST, ETC.**

Sturtevant, B. F. Co. ....Hyde Park, Mass.

**FEED WATER PURIFIERS AND HEATERS.**

Koss Valve Co. ....Troy, N. Y.

**FIXTURES FOR LAMPS, OIL OR ELECTRIC.**

General Electric Co. ....Schenectady, N. Y.  
 Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.

**FORGES.**

Sturtevant, B. F. Co. ....Boston.

**FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.**

Cleveland City Forge & Iron Co. ....Cleveland.  
 Erie River Ship & Engine Co. ....Quincy, Mass.  
 Macbeth Iron Co. ....Cleveland.

**FLUE WELDING.**

Fix's, S. Sons. ....Cleveland.

**FURNACES FOR BOILERS.**

Continental Iron Works. ....New York.

**FUELING COMPANIES AND COAL DEALERS.**

Hanna, M. A. & Co. ....Cleveland.  
 Ironville, Dock & Coal Co. ....Toledo, O.  
 Parker Bros. Co., Ltd. ....Detroit.  
 Picklands, Mather & Co. ....Cleveland.  
 Pittsburg Coal Co. ....Cleveland.  
 Smith, Stanley B., & Co. ....Detroit.  
 Smith Coal & Dock Co., Stanley B. ....Toledo, O.

**GASKETS, RUBBER.**

New York Belting & Packing Co. ....New York.

**GAS BUOYS.**

Safety Car Heating & Lighting Co. ....New York.

**GAS AND GASOLINE ENGINES.**

Chase Machine Co. ....Cleveland.  
 Georgian Bay Engineering Works. ....Midland, Ont.  
 Reliance Mfg. Co. ....City Island, New York.  
 Temple Pump Co. ....Chicago.

**GAUGES, STEAM AND VACUUM.**

American Steam Gauge & Valve Mfg. Co. ....Boston.  
 Ashton Valve Co. ....Boston.  
 Lunkenheimer Co. ....Cincinnati.  
 Standard Gauge Mfg. Co. ....Syracuse, N. Y.

**GAUGES, WATER.**

Bonner & Co., Wm. T. ....Boston.  
 Lunkenheimer Co. ....Cincinnati, O.  
 Standard Gauge Mfg. Co. ....Syracuse, N. Y.

**GRAPHITE.**

Dixon Crucible Co., Joseph. ....Jersey City, N. J.

**HAMMERS, STEAM.**

Chase Machine Co. ....Cleveland.

**HEATING APPARATUS.**

Bayley & Sons Co., Wm. ....Milwaukee, Wis.  
 Sturtevant, B. F. Co. ....Hyde Park, Mass.

**HOISTS FOR CARGO, ETC.**

American Ship Building Co. ....Cleveland.  
 Brown Hoisting Machinery Co. (Inc.) ....Cleveland.  
 Chase Machine Co. ....Cleveland.  
 Elwell-Parker Electric Co. ....Cleveland.  
 General Electric Co. ....New York.  
 Georgian Bay Engineering Works. ....Midland, Ont.  
 Hyde Windlass Co. ....Bath, Me.  
 Lidgerwood Mfg. Co. ....New York.  
 Marine Iron Co. ....Bay City.  
 Mietz, Aug. ....New York.  
 Pawling & Harnischfeger. ....Milwaukee.  
 Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.

**HOLLOW STAYBOLT IRON.**

Falls Hollow Staybolt Co. ....Cuyahoga Falls, O.

**HOSE, RUBBER.**

New York Belting & Packing Co. ....New York.

**HYDRAULIC DREDGES.**

Great Lakes Engineering Works. ....Detroit.

**HYDRAULIC TOOLS.**

Watson-Stillman Co., The. ....New York.

**ICE MACHINERY.**

Great Lakes Engineering Works. ....Detroit.  
 Roelker, H. B. ....New York.

**INDICATORS FOR STEAM ENGINES.**

American Steam Gauge Co. ....Boston.  
 Ashton Valve Co. ....Boston.

**INJECTORS.**

American Injector Co. ....Detroit.  
 Crane Co. ....Chicago.  
 Jenkins Bros. ....New York.  
 Lunkenheimer Co. ....Cincinnati.  
 Penberthy Injector Co. ....Detroit, Mich.

**INSURANCE, MARINE.**

Elphicke, C. W. & Co. ....Chicago.  
 Fleming & Co., P. H. ....Chicago.  
 Frankfort Marine, A. & P. G. Ins. Co. ....New York.

**INSURANCE, MARINE—Continued.**

Gilchrist & Co., C. P. ....Cleveland.  
 Hawgood & Co., W. A. ....Cleveland.  
 Helm & Co., D. T. ....Duluth.  
 Hutchinson & Co. ....Cleveland.  
 McCarthy, T. R. ....Montreal.  
 McCurdy, Geo. L. ....Chicago.  
 Mitchell & Co. ....Cleveland.  
 Parker Bros. Co., Ltd. ....Detroit.  
 Peck, Chas. E. & W. F. ....New York & Chicago.  
 Prindiville & Co. ....Chicago.  
 Richardson, W. C. ....Cleveland.  
 Sullivan, D. & Co. ....Chicago.  
 Voss, F. D. ....New York.  
 Weeks, F. H. ....New York.

**IRON ORE AND PIG IRON.**

Bourne-Fuller Co. ....Cleveland.  
 Hanna, M. A. & Co. ....Cleveland.  
 Pickands, Mather & Co. ....Cleveland.

**LAUNCHES—STEAM, NAPHTHA, ELECTRIC.**

Georgian Bay Engineering Works. ....Midland, Ont.  
 Marine Construction & D. D. Co. ....Mariner's Harbor, S. I., N. Y.  
 Truscott Boat Mfg. Co. ....St. Joseph, Mich.  
 Willard, Chas. P. ....Chicago.

**LIFE PRESERVERS, LIFE BOATS, BUOYS.**

Armstrong, Cork Co. ....Pittsburg.  
 Drein, Thos. & Son. ....Wilmington, Del.  
 Kahnweiler's Sons, D. ....New York.

**LIGHTS, SIDE AND SIGNAL.**

Russell & Watson. ....Buffalo.

**LOGS.**

Walker & Sons, Thomas. ....Birmingham, Eng.  
 Also Ship Chandlers.

**LUBRICATING GRAPHITE.**

Dixon Crucible Co., Joseph. ....Jersey City, N. J.

**LUBRICATORS.**

Crane Co. ....Chicago.  
 Lunkenheimer Co. ....Cincinnati.

**LUMBER.**

Martin-Barriss Co. ....Cleveland.

**MACHINISTS.**

Chase Machine Co. ....Cleveland.  
 Gagebic Steam Boiler Works. ....Duluth, Minn.  
 Hickler Bros. ....Sault Ste. Marie, Mich.  
 Lockwood Mfg. Co. ....East Boston, Mass.  
 Macbeth Iron Co. ....Cleveland.  
 Union Machine & Boiler Co. ....Cleveland.

**MACHINE TOOLS (WOOD WORKING).**

Atlantic Works, Inc. ....Philadelphia.

**MARINE RAILWAYS.**

Hickler Bros. ....Sault Ste. Marie, Mich.

**MARINE GLUE.**

Ferdinand & Co., L. W. ....Boston, Mass.

**MARINE RAILWAYS, BUILDERS OF.**

Crandall & Son, H. I. ....East Boston, Mass.

**MATTRESSES, CUSHIONS, BEDDING.**

Fogg, M. W. ....New York.

**MECHANICAL DRAFT FOR BOILERS.**

American Ship Building Co. ....Cleveland.  
 Detroit Ship Building Co. ....Detroit.  
 Great Lakes Engineering Works. ....Detroit.  
 Sturtevant, B. F. Co. ....Hyde Park, Mass.

**MELTING POT AND PAYING LADLE. (For Paying Seams of Decks with Marine Glue.)**

Ferdinand & Co., L. W. ....Boston.

**METALLIC PACKING.**

Katzenstein, L. & Co. ....New York.

**METAL POLISH.**

Bertram's Oil Polish Co. ....Boston.

**MOTORS, GENERATORS—ELECTRIC.**

General Electric Co. ....Schenectady, N. Y.  
 Bayley & Sons Co., Wm. ....Milwaukee, Wis.  
 Sturtevant, B. F. Co. ....Hyde Park, Mass.  
 Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.



## Buyers' Directory of the Marine Trade.—Continued.

**NAUTICAL INSTRUMENTS.**

Ritchie, E. S., &amp; Sons.....Brookline, Mass.

**NAVAL ARCHITECTS.**

Hynd, Alexander.....Cleveland.  
 Kidd, Joseph.....Duluth, Minn.  
 Lovejoy, H. O.....Buffalo.  
 Matteson & Drake.....Philadelphia.  
 Mosher, Chas. D.....New York.  
 Nacey, James.....Cleveland.  
 Rice, Henry.....Buffalo.  
 Sadler, Perkins & Field.....New York.  
 Steel, Adam.....Cleveland.  
 Wood, W. J.....Chicago.

**OAKUM.**

DeGrauw, Aymar & Co.....New York.  
 Stratford, Oakum Co.....Jersey City, N. J.

**OIL FOR PAINTING.**

Sipe &amp; Co., James B.....Allegheny, Pa.

**OIL ENGINES.**

Mietz, Aug. ....New York.

**OILS AND LUBRICANTS.**

Dixon Crucible Co., Joseph.....Jersey City, N. J.  
 Standard Oil Co.....Cleveland.

**PACKING.**

Crane Co. ....Chicago.  
 Jenkins Bros. ....New York.  
 Katzenstein, L. & Co.....New York.  
 New York Belting & Packing Co.....New York.

**PACKING TOOL.**

Matteson &amp; Drake.....Philadelphia.

**PAINTS.**

Baker, Howard H. & Co.....Buffalo.  
 Detroit Varnish Co.....Detroit.  
 Detroit White Lead Works.....Detroit.  
 Forest City Paint and Varnish Co.....Cleveland.  
 New Jersey Zinc Co.....New York.  
 Sipe & Co., James B.....Allegheny, Pa.  
 Upson-Walton Co.....Cleveland.

**PATTERN SHOP MACHINERY.**

Atlantic Works, Inc.....Philadelphia.

**PILE DRIVING AND SUBMARINE WORK.**

Buffalo Dredging Co.....Buffalo.  
 Chicago & Gt. Lakes Dredge & Dock Co.....Chicago.  
 Dunbar & Sullivan Dredging Co.....Buffalo.  
 Fitz-Simons & Connell Co.....Chicago.  
 Hickler Bros. ....Sault Ste. Marie, Mich.  
 Parker Bros. Co., Ltd.....Detroit.  
 Smith Co., L. P. & J. A.....Cleveland.  
 Starke Dredge & Dock Co., C. H.....Milwaukee.  
 Sullivan, M. ....Detroit.

**PIPE, WROUGHT IRON.**

Bourne-Fuller Co.....Cleveland.  
 Crane Co. ....Chicago.  
 Macbeth Iron Co.....Cleveland.

**PLANING MILL MACHINERY.**

Atlantic Works, Inc.....Philadelphia.

**PLATES—SHIP, STRUCTURAL, ETC.**

Bourne-Fuller Co.....Cleveland.  
 Otis Steel Co.....Cleveland.

**PNEUMATIC TOOLS.**

Allen, John F.....New York.

**POLISH FOR METALS.**

Bertram's Oil Polish Co.....Boston.

**PRESSURE REGULATORS.**

Kieley & Mueller.....New York.  
 Ross Valve Co.....Troy, N. Y.

**PROPELLER WHEELS.**

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Detroit Ship Building Co.....Detroit.  
 Fore River Ship & Engine Co., Quincy, Mass.  
 Great Lakes Engineering Works.....Detroit.  
 Hyde Windlass Co.....Bath, Me.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Macbeth Iron Co.....Cleveland.  
 Milwaukee Dry Dock Co.....Milwaukee.  
 Newport News Ship Building Co.....Newport News, Va.  
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.  
 Roelker, H. B.....New York.  
 Sheriffs Mfg. Co.....Milwaukee.  
 Superior Ship Building Co.....Superior, Wis.  
 Thropp & Sons Co., J. E.....Trenton, N. J.  
 Trout, H. G.....Buffalo.  
 United States Ship Building Co.....New York.

**PROJECTORS, ELECTRIC.**

General Electric Co.....Schenectady, N. Y.  
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**PUMPS FOR VARIOUS PURPOSES.**

Blake, Geo. F., Mfg. Co.....New York.  
 Great Lakes Engineering Works.....Detroit.  
 Kingsford Foundry & Machine Works.....Oswego, N. Y.

**PUNCHES, RIVETERS, SHEARS.**

Allen, John F.....New York.

**RANGES.**

Russell &amp; Watson.....Buffalo.

**REFRIGERATING APPARATUS.**

Great Lakes Engineering Works.....Detroit.  
 Roelker, H. B.....New York.

**REGISTER FOR CLASSIFICATION OF VESSELS.**

Great Lakes Register.....Cleveland.  
 Record of American & Foreign Shipping.....New York.

**REPAIRS—ENGINE AND BOILER.**

(See also Boiler Manufacturers and Engine Builders.)

Georgian Bay Engineering Works.....Midland, Ont.  
 Gogebic Steam Boiler Works.....Duluth, Minn.  
 Force City Boiler Co.....Cleveland.  
 Marine Iron Co.....Duluth, Minn.

**RIVETING MACHINES.**

Allen, John F.....New York.

**RIVETS, STEEL, FOR SHIPS AND BOILERS.**

Bourne-Fuller Co.....Cleveland.

**SAFETY VALVES.**

American Steam Gauge & Valve Mfg. Co.....Boston.  
 Ashton Valve Co.....Boston.  
 Crane Co.....Chicago.  
 Lunkenheimer Co.....Cincinnati.

**SAIL MAKERS.**

Baker, Howard H. & Co.....Buffalo.  
 Upson-Walton Co.....Cleveland.  
 Wilson & Silsby.....Boston.

**SALVAGE COMPANIES.**

See Wrecking Companies.

**SEARCH LIGHTS.**

General Electric Co.....Schenectady, N. Y.  
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**SHEARS.**

See Punches, Rivets, and Shears.

**SHIP AND BOILER PLATES AND SHAPES.**

Bourne-Fuller Co.....Cleveland.  
 Otis Steel Co.....Cleveland.

**SHIP BUILDERS.**

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Bertram Engine Works Co., Ltd. Toronto, Can.  
 Buffalo Dry Dock Co.....Buffalo.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Craig Ship Building Co.....Toledo, O.  
 Chicago Ship Building Co.....Chicago.  
 Detroit Ship Building Co.....Detroit.  
 Fore River Ship & Engine Co., Quincy, Mass.  
 Great Lakes Engineering Works.....Detroit.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Manitowoc Dry Dock Co.....Manitowoc, Wis.  
 Milwaukee Dry Dock Co.....Milwaukee.  
 Newport News Ship Building Co.....Newport News, Va.  
 Roach's Ship Yard.....Chester, Pa.  
 Shipowner's Dry Dock Co.....Chicago.  
 Smith & Son, Abram.....Algonac, Mich.  
 United States Ship Building Co.....New York.  
 Willard, Chas. P. & Co.....Chicago.

**SHIP CHANDLERS.**

Baker, Howard H. & Co.....Buffalo.  
 Marine Mfg. & Supply Co.....New York.  
 Upson-Walton Co.....Cleveland.

**SHIP LANTERNS AND LAMPS.**

Russell &amp; Watson.....Buffalo.

**SHIP TIMBER.**

Martin-Barriss Co.....Cleveland.

**SMOOTH-ON COMPOUND, FOR REPAIRS.**

Smooth-On Mfg. Co.....Jersey City, N. J.

**STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.**

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

**STEAM VESSELS FOR SALE.**

Elwell, Jas. W. & Co.....New York.  
 Gilchrist & Co., C. P.....Cleveland.  
 Holmes, Samuel.....New York.  
 Lester, S. S.....Quebec, Can.  
 McCarthy, T. R.....Montreal, Can.  
 Weeks, F. H.....New York.

**STEAMSHIP LINES, PASS. AND FREIGHT.**

American Line.....New York.  
 Anchor Line.....Buffalo.  
 Boston Steamship Co.....Boston.  
 Cleveland & Buffalo Transit Co.....Cleveland.  
 Detroit & Cleveland Line.....Cleveland.  
 Erie & Western Trans. Co.....Buffalo.  
 Goodrich Trans. Co.....Chicago.  
 International Mercantile Marine Co.....Philadelphia.  
 Manitou Steamship Co.....Chicago.  
 Mexican-American S. S. Co.....New Orleans, La.  
 New York & Cuba Mail S. S. Co.....New York.  
 Niagara, St. Catharines & Toronto Ry. & Nav. Co.....St. Catharines, Ont.  
 Northern Michigan Trans. Co.....Chicago.  
 Red Star Line.....New York.  
 Richelieu & Ontario Nav. Co.....Montreal, Can.  
 United Fruit Co.....Boston.

**STEEL CASTINGS.**

Macbeth Iron Co.....Cleveland.  
 Otis Steel Co.....Cleveland.

**STEERING APPARATUS.**

American Ship Building Co.....Cleveland.  
 Chase Machine Co.....Cleveland.  
 Dake Engine Co.....Grand Haven, Mich.  
 Detroit Ship Building Co.....Detroit.  
 Hyde Windlass Co.....Bath, Me.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Marine Mfg. & Supply Co.....Cleveland.  
 Moulton Steering Engine Co.....New York.  
 Pawling & Harnischfeger.....Milwaukee.  
 Sheriffs Mfg. Co.....Milwaukee.

**SUBMARINE DIVING APPARATUS.**

Morse & Son, A. J.....Boston.  
 Schrader's Son, A.....New York.

**SURVEYORS, MARINE.**

Gaskin, Edward.....Buffalo.  
 Hynd, Alexander.....Cleveland.  
 Lovejoy, H. O.....Buffalo.  
 Matteson & Drake.....Philadelphia.  
 Parker Bros. Co., Ltd.....Detroit.  
 Nacey, James.....Cleveland.  
 Rice, Henry.....Buffalo.  
 Steel, Adam.....Cleveland.  
 Wood, W. J.....Chicago.

**TESTS OF MATERIALS.**

Hunt, Robert W. & Co.....Chicago.  
 Pittsburg Testing Laboratory, Ltd.....Pittsburg.

**TILING, INTERLOCKING RUBBER.**

New York Belting &amp; Packing Co.....New York.

**TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.**

Allen, John F.....New York.  
 Watson-Stillman Co.....New York.

**TOOLS, WOOD WORKING.**

Atlantic Works, Inc.....Philadelphia.

**TOWING MACHINES.**

American Ship Windlass Co.....Providence, R. I.  
 Chase Machine Co.....Cleveland.

**TOWING COMPANIES.**

Donnelly Salvage & Wrecking Co.....Kingston, Ont.  
 Great Lakes Towing Co.....Cleveland.  
 Midland Towing & Wrecking Co., Ltd.....Midland, Ont.

**TRAPS, STEAM.**

Kieley & Mueller.....New York.  
 Lunkenheimer Co.....Cincinnati.  
 Sturtevant Co., B. F., Hyde Park, Mass.

**TRUCKS.**

Boston &amp; Lockport Block Co.....Boston.

**TUBING, SEAMLESS.**

Shelby Steel Tube Co.....Pittsburg, Pa.

## Buyers' Directory of the Marine Trade.—Continued.

## VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge & Valve Mfg. Co. Boston.  
Ashton Valve Co. Boston.  
Crane Co. Chicago.  
Jenkins Bros. New York.  
Kieley & Mueller New York.  
Lunkenheimer Co. Cincinnati.  
Ross Valve Co. Troy, N. Y.

## VALVES FOR WATER AND GAS.

Ross Valve Co. Troy, N. Y.

## VARNISHES.

Detroit Varnish Co. Detroit.  
Detroit White Lead Works. Detroit.  
Forest City Paint & Varnish Co. Cleveland.  
New Jersey Zinc Co. New York.  
Also Ship Chandlers.

## VENTILATING APPARATUS FOR SHIPS.

Bayley & Sons Co., Wm. Milwaukee, Wis.  
Sturtevant, B. F. Co. Hyde Park, Mass.

## VESSEL AND FREIGHT AGENTS.

Boland, John J. Buffalo.  
Brown & Co. Buffalo.  
Ewell, Jas. W. & Co. New York.  
Elphicke, C. W. & Co. Chicago.  
Fleming & Co., P. H. Chicago.  
Gierst & Co., C. P. Cleveland.  
Hall & Root Buffalo.

## VESSEL AND FREIGHT AGENTS—Con.

Helm & Co., D. T. Duluth.  
Hawgood & Co., W. A. Cleveland.  
Holmes, Samuel New York.  
Hutchinson & Co. Cleveland.  
Lester, S. S. Quebec, Can.  
McCarthy, T. R. Montreal.  
Mitchell & Co. Cleveland.  
Parker Bros. Co., Ltd. Detroit.  
Prindiville & Co. Chicago.  
Richardson, W. C. Cleveland.  
Sullivan, D. & Co. Chicago.  
Weeks, F. H. New York.

## WATER GAUGES.

Bonner & Co., Wm. T. Boston.  
Lunkenheimer Co. Cincinnati, O.

## WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. Buffalo.  
DeGrauw, Aymar & Co. New York.  
Upson-Walton Co. Cleveland.

## WHISTLES, STEAM.

American Steam Gauge & Valve Mfg. Co. Boston.  
Ashton Valve Co. Boston.  
Lunkenheimer Co. Cincinnati.

## WINDLASSES.

American Ship Windlass Co. Providence, R. I.  
American Ship Building Co. Cleveland.  
Hyde Windlass Co. Bath, Me.  
Jenks Ship Building Co. Port Huron, Mich.  
Marine Mfg. & Supply Co. New York.

## WINCHES.

American Ship Windlass Co. Providence, R. I.  
Georgian Bay Engineering Works. Midland, Ont.  
Hyde Windlass Co. Bath, Me.

## WOOD WORKING MACHINERY.

Atlantic Works, Inc. Philadelphia.

## WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. Kingston, Ont.  
Great Lakes Towing Co. Cleveland.  
Midland Towing & Wrecking Co., Ltd. Midland, Ont.  
Parker Bros. Co., Ltd. Detroit.

## YACHT AND BOAT BUILDERS.

Bertram Engine Works Co., Ltd. Toronto, Can.  
Drein, Thos. & Son. Wilmington, Del.  
Georgian Bay Engineering Works. Midland, Ont.  
Truscott Boat Mfg. Co. St. Joseph, Mich.  
Willard, Chas. P. & Co. Chicago.

## YAWLS.

Drein, Thos. & Son. Wilmington, Del.

## ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (\*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.  
The dagger (†) indicates that advertisement appears once a month.

*Allen, John F. .... 3	Elphicke, C. W., & Co. .... 48	Lidgerwood Mfg. Co. .... 45	Richelieu & Ontario Nav. Co. .... 38
Almy Water Tube Boiler Co. .... 43	Elwell, Jas. W., & Co. .... 48	Lockwood Mfg. Co. .... 41	*Ritchie & Sons, E. S. .... 47
American Bureau of Shipping .... 4	Erie & Western Trans. Co. .... 38	Lovejoy, H. O. .... 49	Roberts Water-Tube Boiler Co. .... 42
American Investor Co. .... 4		L. S. & M. S. Ry. .... 55	Roecker, H. B. .... 41
American Line .... 39		Lunkenheimer Co. .... 46	Ross Valve Co. .... 46
American Ship Building Co. .... 11	Falls Hollow Staybolt Co. .... 47		Russell & Watson .... 45
American Ship Windlass Co. .... 2	Faust, Wm. H. .... 48	McCarthy, T. R. .... 48	
American Steam Gauge Co. .... 56	Ferdinand & Co., L. W. .... 4	McCurdy, Geo. L. .... 48	Sadler, Perkins & Field. .... 49
Anchor Line .... 30	Fields, Capt. J. M. .... 49	*McNab & Harlin Mfg. Co. .... 56	Safety Car Heating & Lighting Co. .... 8
Armstrong Cork Co. .... 56	Fitz-Simons & Connell Co. .... 37	Macbeth Iron Co. .... 49	Scherzer Rolling Lift Bridge Co. .... 13-45
Ashton Valve Co. .... 14	Fix's S. Sons .... 46	MacDonald, Ray G. .... 49	Schrader's Sons, A. .... 2
Atlantic Works .... 41	Fleming & Co., P. H. .... 48	Manitowoc Dry Dock Co. .... 41	Shaw, Warren, Cady & Oakes. .... 49
*Atlantic Works, Inc. .... 9	Fletcher, W. & A., Co. .... 41	Manitou Steamship Co. .... 38	*Shelby Steel Tube Co. .... 8
	Fogg, M. W. .... 2	Marine Iron Co., Bay City, Mich. .... 41	Sheriffs Mfg. Co. .... 45
Babcock & Wilcox Co. .... 8	Fore River Ship & Engine Co. .... 41	Marine Iron Co., Duluth .... 41	Shipowners' Dry Dock Co. .... 41
Bayley & Sons Co., Wm. .... 4	Forest City Boiler Co. .... 48	*Marine Mfg. & Supply Co. .... 40	Shipping World. .... 7
Baker, Howard H. & Co. .... 56	Forest City Paint & Varnish Co. .... 42	Martin-Barriss Co. .... 43	Sipe & Co., James B. .... 9
*Bertram Engine Works Co., Ltd. .... 14	Frankfort M. A. & P. G. I. Co. .... 44	Matteson & Drake. .... 40-49	*Smith & Son, Abram. .... 47
Bake, Geo. F., Mfg. Co. .... 41		Mexican-American S. S. Co. .... 38	Smith Co., L. P. & J. A. .... 37
Boland, J. J. .... 48	General Electric Co. .... 14	Midland Towing & Wrecking Co., Ltd. .... 56	Smith Coal & Dock Co., Stanley B. .... 9
*Bonner & Co., Wm. T. .... 35	*Georgian Bay Engineering Wks. .... 41	Mietz, Aug. .... 6	Smith, Stanley B., & Co. .... 9
Boston & Lockport Block Co. .... 35	Gilchrist, Albert J. .... 48	Milwaukee Dry Dock Co. .... 10	Smooth-On Mfg. Co. .... 54
Boston Steamship Co. .... 39	Globe Steam Boiler Works .... 41	Mitchell & Co. .... 48	*Standard Gauge Mfg. Co. .... 9
Burgess-Fuller Co. .... 14	Goodrich Trans. Co. .... 38	Morse & Son, A. J. .... 46	*Standard Oil Co. .... 55
Bowers, L. M. & Co. .... 55	Goulding, Holding & Masten. .... 48	Mosher Water-Tube Boiler Co. .... 43	Starke Dredge & Dock Co., C. H. .... 37
Brown, Hoisting Machinery Co., Inc. .... 2	Great Lakes Engineering Works .... 5	Moulton Steering Engine Co. .... 42	Steel, Adam. .... 49
Buffalo Dredging Co. .... 46	Great Lakes Register .... 52		Stirling Co. .... 8
Buffalo Dry Dock Co. .... 10	*Great Lakes Towing Co. .... 11	Nacey, James. .... 49	Stratford Oakum Co., Geo. .... 45
	Hall & Root. .... 48	Newport News Ship Building & Dry Dock Co. .... 7	Sturtevant, B. F., Co. .... 56
*Clendenen Anchor-Rockland Mach. Co. .... 13	Hanna, M. A., & Co. .... 47	New Jersey Zinc Co. .... 6	Sullivan, M. .... 37
Chas. Machine Co. .... 6	Hawgood & Co., W. A. .... 48	New York Belting & Packing Co. .... 4	Sullivan & Co. .... 48
Chicago & Gt. L. Dredge & Dock Co. .... 37	Helm & Co., D. T. .... 48	New York & Cuba Mail S. S. Co. .... 39	Superior Ship Building Co. .... 10
Chicago Ship Building Co. .... 10	Hickler Bros. .... 37	Niagara, St. C. & T. Ry. & N. Co. .... 38	
Cleveland City Forge & Iron Co. .... 47	Holmes, Samuel .... 48	Northern Mich. Trans. Co. .... 38	Taylor Water-Tube Boiler Co. .... 43
Cleveland & Buffalo Transit Co. .... 38	Hoyt, Dustin & Kelley. .... 48	Northwestern Steam Boiler & Mfg. Co. .... 42	*Temple Pump Co. .... 45
Continental Iron Works .... 2	Hunt, Robert W., & Co. .... 49		Thrope, J. E., & Sons Co. .... 46
*Contractors Supply & Equipment Co. .... 9	Hutchinson & Co. .... 48	Otis Steel Co. .... 3	Trout, H. G. .... 45
Curt, Chas. & Son. .... 46	Hyde Windlass Co. .... 56		Truscott Boat Mfg. Co. .... 40
*Curtis Ship Building Co. .... 11	Hynd, Alexander. .... 49	Parker Bros. Co. .... 48	
Craney, Wm. & Sons, S. & E. B. Co. .... 41		Pawling & Harnischfeger. .... 42	Union Machine & Boiler Co. .... 47
*Crane, Hall & Son, H. I. Crane Co. .... 43-44	International Mercantile Marine Co. .... 39	Peck, Chas. E. & W. F. .... 44	United Fruit Co. .... 38
	Ironville Dock & Coal Co. .... 47	*Penberthy Injector Co. .... 3	Upson-Walton Co. .... 56
D. & C. Lane. .... 38	Jenkins Brothers .... 12	Phosphor Bronze Smelting Co., Ltd. .... 40	U. S. Ship Building Co. .... 3
Dake Engine Co. .... 42	Jenks Ship Building Co. .... 14	Pickands, Mather & Co. .... 47	
Dake, Eng. Drug & Chemical Wks. .... 9	Kahnweiler's Sons, David. .... 40	Pittsburg Coal Co. .... 9	Victor Metals Co. .... 2
Derrick, Aymar & Co. .... 47	Katzenstein, L., & Co. .... 40	Pittsburg Testing Laboratory, Ltd. .... 49	
Dickinson, Belleville & Co. .... 14	Kidd, Joseph. .... 49	Potter & Potter. .... 49	Walker, Thomas, & Son. .... 43
Dodge & River Iron S. B. & E. Works. .... 41	Kieley & Mueller. .... 35	Potter, J. D. .... 40	Ward Line. .... 39
Detroit Ship Building Co. .... 11	Kingsford Foundry & Machine Works. .... 42	Powell, Ambrose V. .... 49	*Watson-Stillman Co. .... 55
Detroit White Lead Works. .... 46	Kremer, C. E. .... 48	Prindiville & Co. .... 48	Weeks, F. H. .... 48
Detroit & Erie City Co. .... 46		Record of American & Foreign Shipping. .... 44	Westinghouse Electric & Mfg. Co. .... 53
Detroit Salvage & Wrecking Co. .... 44	Lackawanna Railroad. .... 54	Red Star Line. .... 39	White, Johnson, McCaslin & Cannon. .... 48
Dreier, Thos. & Son. .... 40	Lebanon Chain Works. .... 48	Reliance Mfg. Co. .... 40	*Willard, Chas. P., & Co. .... 35
Dredger & Sullivan Dredging Co. .... 37	LeMois Scientifique et Industriel. .... 4	Rice, Henry. .... 48	Wood, W. J. .... 49
	Lester, S. S. .... 48	Richardson, W. C. .... 48	

## THE L. P. & J. A. SMITH COMPANY.

CONTRACTORS FOR PUBLIC WORKS

Dredging,	Dry Docks and	Bridges,
Harbor Work,	Pier Building,	Submarine
Pile Driving,	Railroads,	Foundations,
Breakwaters,	Canals,	Etc., Etc.

Offices: Williamson Bldg., Cleveland, O.

## C. H. STARKE DREDGE & DOCK CO.,

Contractors for Public Works.

**DREDGING, PILE DRIVING,  
AND  
SUBMARINE PIPE LAYING.**

Canal Street, West of First Avenue,

Milwaukee, - - Wisconsin.

## N. SULLIVAN, DREDGING OF ALL KINDS.

THE REMOVING OF DEEP  
WATER EARTH AND ROCK  
A SPECIALTY.

53 Woodward Ave. Terrace,  
DETROIT, - - - MICH.

## SMOOTH-ON

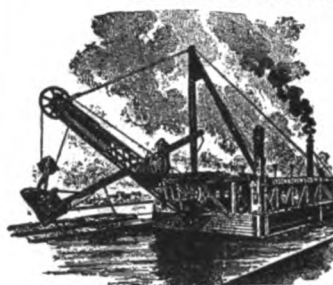
**Iron Cement No. 1  
FOR STOPPING BOILER LEAKS.**

Send for Catalogue and Prices.

**SMOOTH-ON MANUFACTURING CO.**

572-74 Communipaw Ave., Jersey City, N. J., U.S.A.  
Chicago Office, 61 N. Jefferson Street.

## CHICAGO & GREAT LAKES DREDGE AND DOCK CO.



OWNS AND OPERATES THE PLANTS  
OF THE FORMER COMPANIES:

Lydon & Drews Co.,  
Hausler & Lutz Co.,  
Green's Dredging Co.,  
Chicago Star Con. & D.  
Co.,  
McMahon & Montgomery  
Co.,  
Chicago Dredging & Dock  
Co.,  
Griffith, McDermott &  
Watt Dredging Co.

Contractors for

**RIVER AND HARBOR IMPROVEMENTS.**

Main Office: -1319-1322 Chamber of Commerce - CHICAGO.

## Dunbar & Sullivan Dredging Co., of Buffalo, N. Y.

Will contract to remove ROCK or EARTH on the Great Lakes to 40 ft. depth.  
To remove ROCK on Atlantic Coast to 40 ft. depth.

THAT'S ALL.

We SOMETIMES rent plant to responsible parties at OUR terms.

Dredges.	Scows.
Brian Boru, Steel.	Monroe Doctrine, 600 yds., Steel.
Tipperary Boy, Steel.	Protective Policy, 500 yds., Steel.
Erin Go Braugh.	Reciprocity, 600 yds., Steel.
Drill Boats.	Cuba Libre, 250 yds., Steel.
Geo. A. Howells and	Gold Standard, 250 yds., Steel.
another, both Steel.	No. 5, 600
Tugs.	No. 6, 600
Shaughraun, Steel.	No. 7, 600
Phil Sheridan, Steel.	No. 8, 600
Spalpeen, Steel.	4,800
Paddy Miles, Steel.	McMyler derrick handling 10
Shaun Rhue, Steel.	tons at 75 ft. radius.
Derrick.	Small Scows.
Faugh a Ballaugh.	

## The Fitz-Simons & Connell Co.

CONTRACTORS  
—FOR—  
PUBLIC WORKS

DREDGING  
DOCKS  
PILE DRIVING  
BREAKWATERS

TUNNELS  
CANALS  
BRIDGES  
FOUNDATIONS

Offices: 1010-1014 Tacoma Building, Chicago.

## HICKLER BROTHERS

**MARINE RAILWAY**

Capacity, 1,000 tons.

Draft, 7½ ft. forward, 13½ ft. aft.

Length on keel blocks, 180 ft.; over all, 190 ft.

Machine Shop, Foundry and Steam Forge.

Dredges, Drill Boats and Derrick Scows.

SAULT STE. MARIE, - MICH.



To couple or uncouple  
steam ship shafts—for  
forcing the bolt in or out

## WATSON- STILLMAN COUPLING BOLT FORCERS

Were Especially Designed.

No. 0 only weighs 75 lbs. yet it  
will bring a pressure of 15 tons to  
bear on the bolt.

No. 2 is for use where the close  
proximity of a bulk head crowds  
the tool for room.

WE BUILD MARINE  
HYDRAULIC JACKS OF  
EVERY DESCRIPTION

WATSON-STILLMAN CO.,

Offices:

46 Day Street, NEW YORK.  
453 The Rookery, CHICAGO.  
Works: Aldene, Union Co., N. J.



### LATEST PATENT ANCHOR

#### THE NATIONAL

APPROVED BY LLOYDS.

Manufactured by

L. M. BOWERS & CO.,

Binghamton, N. Y.

Catalogue on Application.

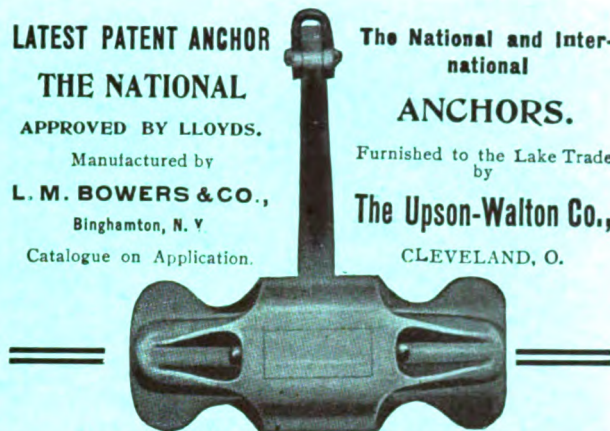
The National and Inter-  
national

#### ANCHORS.

Furnished to the Lake Trade  
by

The Upson-Walton Co.,

CLEVELAND, O.



## IN A RECENT TEST

MADE BY UNCLE SAM,

where both Foreign and Domestic  
Anchors were considered, the ...

**Baldt Stockless Anchor**  
was the only one approved

For Catalogue and particulars address



The Baldt Anchor Co., Chester, Pa.

## LAKE SHORE AND MICHIGAN SOUTHERN RY.

Eastward	Arrive from West	Depart East
No. 18, Southwestern Limited .....	.....	*1:50 a.m.
No. 22, Lake Shore Limited .....	*2:12 a.m.	*2:20 a.m.
No. 20, Chicago and Cleveland Exp. ....	*7:20 a.m.	.....
No. 28, New York and Boston Exp. ....	*7:40 a.m.	*8:00 a.m.
No. 40, Toledo and Buffalo Accom. ....	†10:00 a.m.	†10:30 a.m.
No. 32, Fast Mail .....	*11:25 a.m.	*11:30 a.m.
No. 48, Accommodation via Sandusky .....	†1:40 p.m.	.....
No. 42, Boston-New York Express .....	.....	*11:45 a.m.
No. 44, Cleveland and New York Spl .....	.....	*3:00 p.m.
No. 46, Southwestern Express .....	.....	*3:10 p.m.
No. 116, Ashtabula Accommodation .....	.....	†4:30 p.m.
No. 6, Limited Fast Mail .....	*5:40 p.m.	*5:45 p.m.
No. 26, 20th Century Limited .....	*7:40 p.m.	*7:43 p.m.
No. 10, Chicago, N.Y. & Boston Spl. ....	*7:30 p.m.	*7:50 p.m.
No. 16, New England Express .....	*10:30 p.m.	*10:35 p.m.
No. 2, Day Express .....	†9:10 p.m.	†9:25 p.m.
No. 126, Norwalk Accommodation .....	†7:55 a.m.	.....
Westward	Arrive from East	Depart West
No. 7, Exposition Limited .....	*12:50 a.m.	.....
No. 11, Southwestern Limited .....	*2:55 a.m.	.....
No. 9, Day Express .....	.....	†6:10 a.m.
No. 15, Boston and Chicago Special .....	*3:10 a.m.	*3:15 a.m.
No. 19, Lake Shore Limited .....	*7:15 a.m.	*7:25 a.m.
No. 23, Western Express .....	*10:30 a.m.	*10:35 a.m.
No. 29, Southwestern Special .....	†11:10 a.m.	.....
No. 33, Southwestern Express .....	*12:25 p.m.	.....
No. 133, Cleve'and and Detroit Exp. ....	.....	*12:45 p.m.
No. 47, Accommodation .....	†11:00 a.m.	†3:00 p.m.
No. 141, Sandusky Accommodation .....	.....	†3:10 p.m.
No. 43, Fast Mail .....	*4:35 p.m.	*4:40 p.m.
No. 127, Norwalk Accommodation .....	.....	†5:10 p.m.
No. 37, Pacific Express .....	*6:50 p.m.	*7:20 p.m.
No. 3, Fast Mail Limited .....	*10:50 p.m.	*10:55 p.m.
No. 115, Ashtabula Accommodation .....	*8:30 a.m.	.....

\*Daily. †Except Sunday. ‡Except Monday.  
Trains Nos. 23, 28 and 37 run via Erie Station.  
City Ticket Office, 237 Superior St.

EIGHTEENTH ENLARGED EDITION: OVER 1,800 PAGES.

## The Shipping World Year Book

1904.

EDITED BY MAJOR JONES AND A STAFF OF EXPERTS.  
THE WORK EMBRACES:

- I.—Customs Tariffs of All Nations.
- II.—A Port Directory of the World.
- III.—Board of Trade Rules and Regulations.
- IV.—Load Line Tables, Sailing Rules, Lights, Signals.
- V.—Digest of Shipping Laws. And much other Useful Information.

A LARGE MAP OF THE WORLD, specially designed by J. G. Bartholomew, F. R. G. S., F. R. S. E., is supplied in a pocket in the cover. Introduced by a RETROSPECTIVE VIEW of 1903.

Crown 8vo., cloth. Price: In the United Kingdom, 5s; foreign countries, 6s. Post free.

THE TIMES.—"The information given is wide in scope, and varied in matter, dealing with almost every subject of interest connected with trade, commerce, and navigation. About one-third of the volume is devoted to the tariffs of all nations, which are given in full.

DAILY TELEGRAPH.—"A more comprehensive handbook in its special line for the merchant's desk there could scarcely be."

NEW YORK TRIBUNE.—"This compact book of upwards of twelve hundred pages, published by 'The Shipping World,' of London, contains an immense amount of information of value to the mariner and shipper."

PALL MALL GAZETTE.—"The 'Shipping World Year Book' is sweet seventeen, and would be very much missed if it failed to put in a regular appearance, but fortunately there is no danger of that. The comprehensive retrospect of shipping affairs deserves special attention, and will repay careful study."

GLASGOW HERALD.—"The book more than ever commands the confidence of those large mercantile classes who have been accustomed to consult its pages for world-wide information, and always with success."

NEWCASTLE CHRONICLE.—"Those who refer to it will find all matters appertaining to the business of the shipowner brought right up to date."

LIVERPOOL JOURNAL OF COMMERCE.—"Filled from cover to cover with information absolutely indispensable to all engaged in the over-sea commerce of this country."

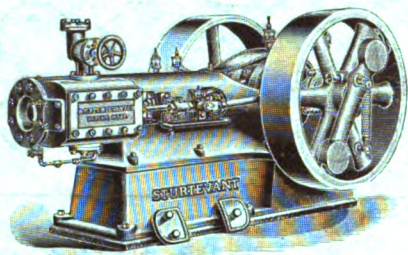
TIMBER.—"There is not another book of its size in the world which contains so much information worth having."

SOUTH WALES DAILY NEWS.—"Major Jones, the capable editor, has anticipated the public attention now being devoted to tariffs, and those of all nations and of the Colonies have been included and revised up to the last hour of publication."

THE SHIPPING WORLD OFFICES, Effingham House, Arundel-street, Strand, London, W. C.



10000

Sturtevant  
Engines

Are in use throughout  
the world.

We build all types  
and sizes from 2 to  
400 H. P.

**B. F. Sturtevant Co.,**

Hyde Park, Mass.

Boston New York Philadelphia  
Chicago London

357



SEND AT  
ONCE FOR  
CATALOG

## AMERICAN

THOMPSON IMPROVED INDICA-  
TOR with NEW DETENT MOTION.

DO NOT let this IMPROVEMENT  
ESCAPE YOUR ATTENTION.

INDICATORS THAT INDICATE  
GAUGES THAT GAUGE  
POPS THAT POP

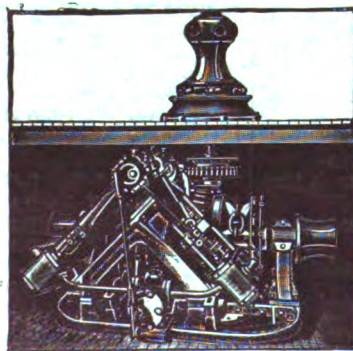
**AMERICAN STEAM GAUGE & VALVE MFG. CO.**

NEW YORK.

BOSTON.

CHICAGO.

## WINDLASSES AND CAPSTANS



HYDE WINDLASS COMPANY,

BATH MAINE.

The Hyde Steam and  
Power Windlasses and  
Capstans are the best  
in the market.

They have been selected  
for most of the vessels now  
building for the Navy De-  
partment, Revenue Ma-  
rine, Light-house Board  
and United State  
Coast Survey

They are being furnished  
for the majority of the  
highest class Steam Ships,  
Merchant Vessels and  
Yachts now building.

Marine Repairs  
AND  
Castings

**The Macbeth Iron Company,**  
CLEVELAND, OHIO,



We have over one thousand  
varieties of

BLOCKS

STEEL, IRON AND WOOD.

If interested, let us send  
you catalogue.

**The UPSON-WALTON Co.,**  
Cleveland.

JAMES PLAYFAIR, { Pres't and  
Gen. Mgr. D. L. WHITE, Vice President.  
J. W. BENSON, Secretary and Treasurer.

MIDLAND TOWING and  
WRECKING CO., Ltd.

MIDLAND, ONT., CANADA.

FIRST-CLASS TUGS FOR WRECKING,  
RAFT TOWING, Etc., STEAM PUMPS,  
DIVERS, JACKS, HAWSERS, LIGHTERS.

## LIFE PRESERVERS-BUOYS.

Aome. Solid Cork. Granulated Cork. Each Preserver stamped by U. S. In-  
spectors guaranteeing proper buoyancy. Cork Filled Yacht Fenders. Cork  
Mooring Buoys. Material and Finish Guaranteed. Orders filled promptly.

**ARMSTRONG CORK COMPANY.**

Boston. New York. Philadelphia. Pittsburg. Chicago.  
St. Louis. Baltimore.

Howard H. Baker & Co.,  
SHIP CHANDLERS  
and SAIL MAKERS

18 to 26 Terrace,

BUFFALO, N. Y.